Hydronic 10/ *Hydronic* M (Water Heater)

Espar Heater Systems

Technical Description
Installation Instructions
Operating Instructions
Maintenance Instructions
Troubleshooting and Repair Instructions
Parts List

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Hydronic 10

25 2081 05 - 12 Volt

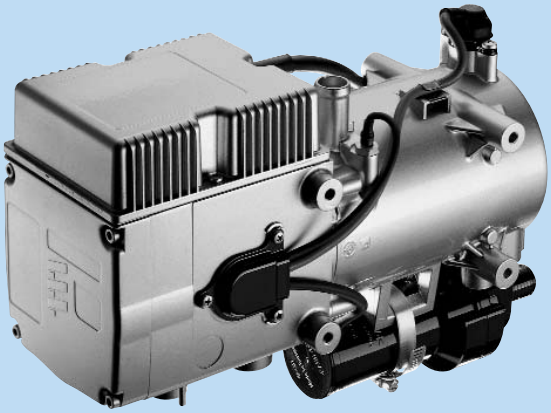
25 2044 05 - 24 Volt

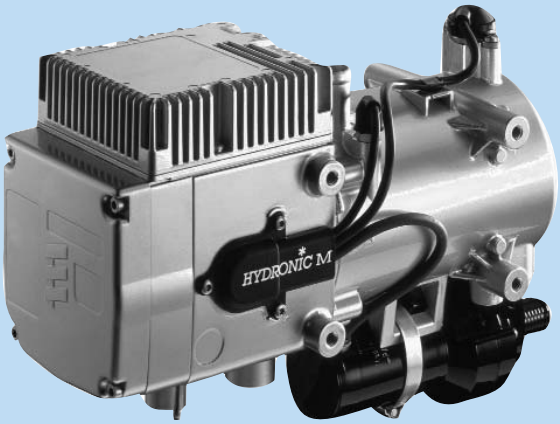
Hydronic M

25 2160 05 - 12 Volt

25 2161 05 - 24 Volt

25 2227 05 - 24 Volt





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Special Notes

Note: Highlight areas requiring special attention or clarification.

Caution: *Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.*

Warning: Indicates that serious or fatal injury may result if specific guidelines are not followed.

This publication was correct at the time of going to print. However, Espar Inc. has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.

Heater Warnings

Warning To Installer

- Correct installation of this heater is necessary to ensure safe and proper operation.
  Read and understand this manual before attempting to install the heater. Failure to follow all these instructions could cause serious or fatal injury.

Warning - Explosion Hazard

- Heater must be turned off while re-fueling.
- Do not install heater in enclosed areas where combustible fumes may be present.
- Do not install heaters in engine compartments of gasoline powered boats.

Warning - Fire Hazard

- Install the exhaust system so it will maintain a minimum distance of 50mm (2”) from any flammable or heat sensitive material.
- Ensure that the fuel system is intact and there are no leaks.

Warning - Asphyxiation Hazard

- Route the heater exhaust so that exhaust fumes cannot enter any passenger compartments.
- If running exhaust components through an enclosed compartment, ensure that it is vented to the outside.

Warning - Safety Hazard on Coolant Heaters Used With Improper Antifreeze Mixtures

- The use of Espar coolant heaters requires that the coolant in the system to be heated contains a proper mixture of water and antifreeze to prevent coolant from freezing or slushing.
- If the coolant becomes slushy or frozen, the heater’s coolant pump cannot move the coolant causing a blockage of the circulating system. Once this occurs, pressure will build up rapidly in the heater and the coolant hose will either burst or blow off at the connection point to the heater.
- This situation could cause engine damage and/or personal injury. Extreme care should be taken to ensure a proper mixture of water and antifreeze is used in the coolant system.
- Refer to the engine manufacturer’s or coolant manufacturer’s recommendations for your specific requirements.

Caution: *During electrical welding work on the vehicle disconnect the power to the heater in order to protect the control unit.*

Note: All measurements contained in this manual contain metric and approximate SAE equivalents in brackets eg 25mm (1”).

Direct questions to Espar Heater Systems:

Canada & U.S.A. **1-800-387-4800**

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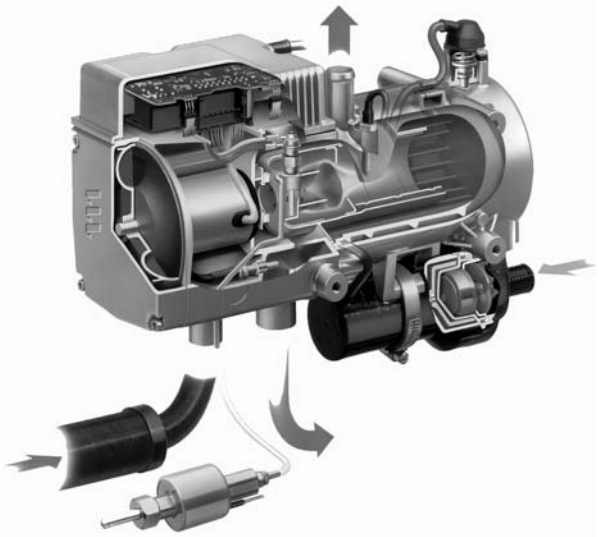
Introduction

Espar's Hydronic 10 Coolant Heater

Quality engineered to provide a dependable means of heating, the Espar Hydronic 10 is a diesel fired coolant heater capable of between 1.5 kW to 9.5 kW/hr (5,100 to 32,400 BTU/hr). The heater can be purchased either in a weather resistant box to protect it from the elements and provide for ease of installation or in the universal form.



This light weight and compact coolant heater offers an affordable heating solution to many applications. The Hydronic 10 is ideal for pre-heating the engines of class 7 and 8 trucks, off-road equipment, buses, boats and in Fuel + Hydraulics in conjunction with appropriate heat exchangers.

The heater pumps coolant from the engine, heats it and returns it to the engine. It features automatic heat regulation while being fuel and power efficient. Since the heater runs on diesel fuel and 12 or 24 volt power, it is able to perform this completely independently of the vehicle engine. A temperature regulating switch in the unit regulates the coolant temperature between a low of 68°C (154°F) and a high of 85°C (185°F) by automatically cycling the heater.

The Hydronic 10 can be operated from the vehicle cab by an on/off switch, a pre-select timer or a combination of both.

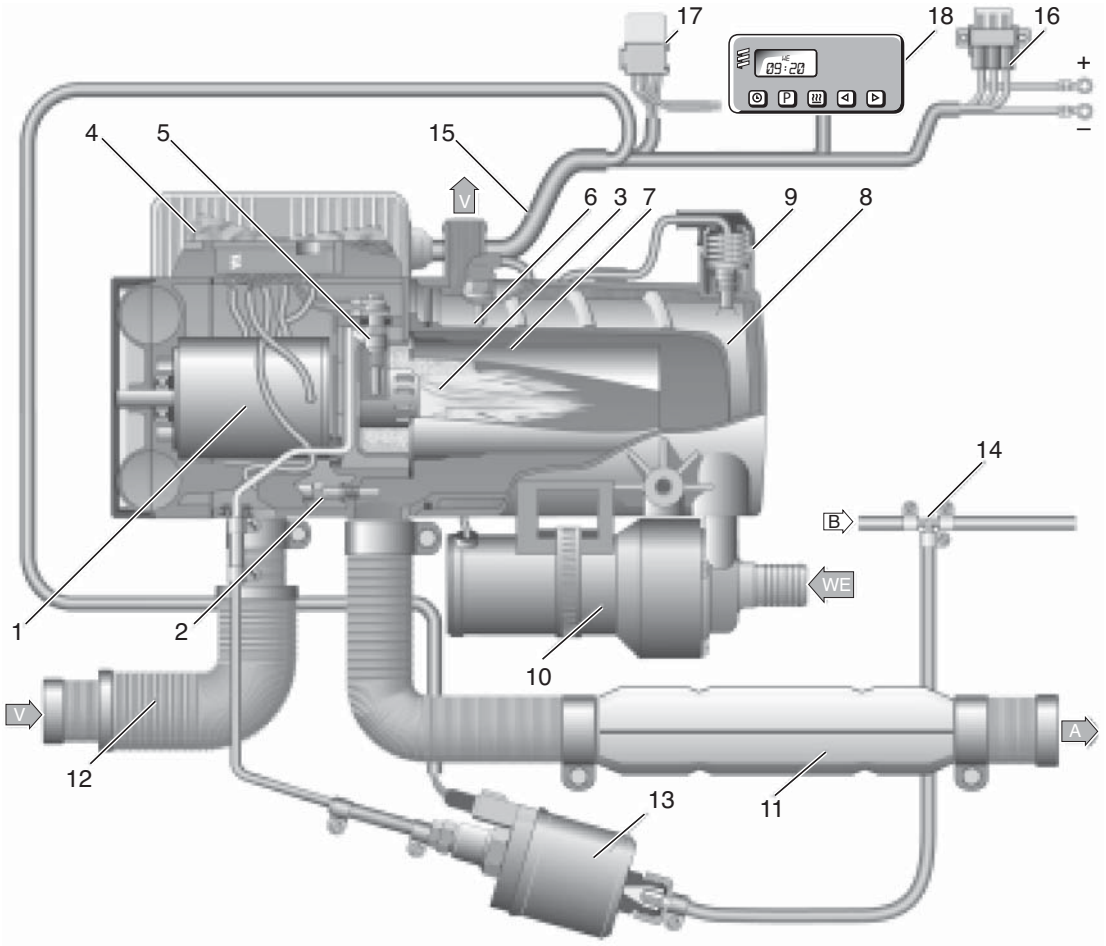
A flame sensor, temperature regulating sensor and overheat sensor are among the safety features which makes the Hydronic 10 a safe and dependable heating system.

Hydronic 10 Specifications

Heat output (±10%)	9.5 kW (32,400 BTU/hr) **- Boost** 7.5 kW (25,600 BTU/hr) **- High** 3.2 kW (10,900 BTU/hr) **- Medium** 1.5 kW (5,100 BTU/hr) **- Low**
Current draw (±10%)	**12Volt** **24Volt** 10.4 - **Boost** - 5.2 amps 6.3 - **High** - 3.2 amps 3.5 - **Medium** - 1.8 amps 2.9 - **Low** - 1.5 amps
Fuel consumption (±10%)	1.2 l/hr (0.32 USgal/hr) **Boost** 0.9 l/hr (0.24 USgal/hr) **High** 0.40 l/hr (0.11 USgal/hr) **Medium** 0.18 l/hr (0.05 USgal/hr) **Low**
Operating Voltage Range	
Minimum Voltage	10 V (20V on 24 volt systems)
Maximum Voltage	15 V (30 V on 24 volt systems)
Coolant pump flow (±10%)	1400 Litre/hr 370 U.S. Gal/hr
Coolant Temperature Range (±5%)	68-85°C (154-185°F)
Overheat coolant temperature shutdown (±5%)	115°C (240°F)
Weight	6.5 kg. (14.3 lbs.)
Controls available	On/Off switch, 99hr. timer or 7 day timer.

Note: The heater is equipped with a high voltage cutout as well a low voltage cutout.

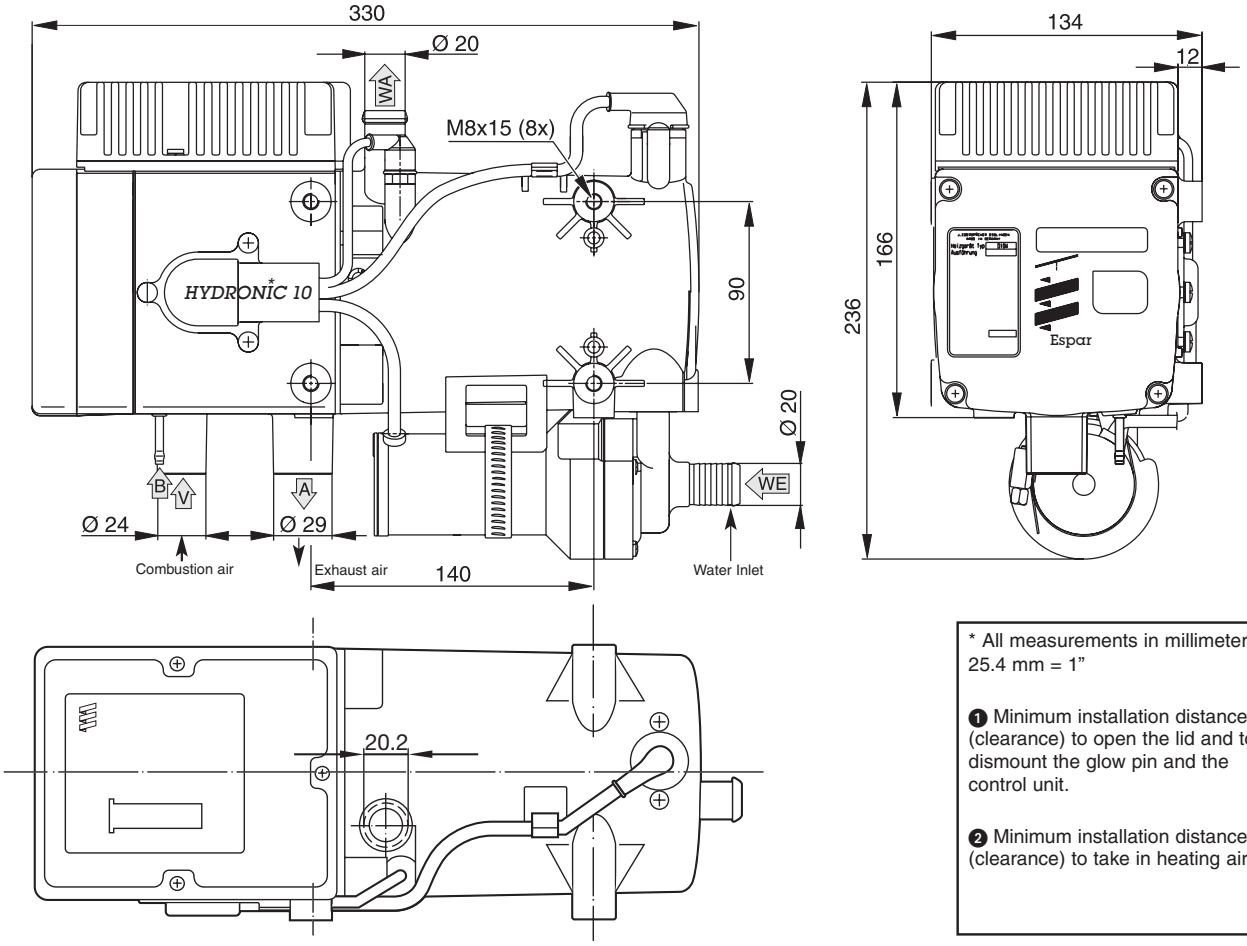
Heater Components



WE = Water inlet
WA = Water outlet
V = Combustion air
B = Fuel
A = Fumes

1 Combustion motor
2 Flame sensor
3 Combustion chamber
4 Control unit
5 Heater plug
6 Temperature sensor
7 Flame tube
8 Heat exchanger
9 Overheating switch
10 Water pump
11 Exhaust silencer
12 Combustion air silencer
13 Fuel feeder pump
14 Fuel branch piece
15 Cable tree
16 Fuse bracket
17 Relay for switching on the vehicle's fan
18 Automatic switch

Principal Dimensions

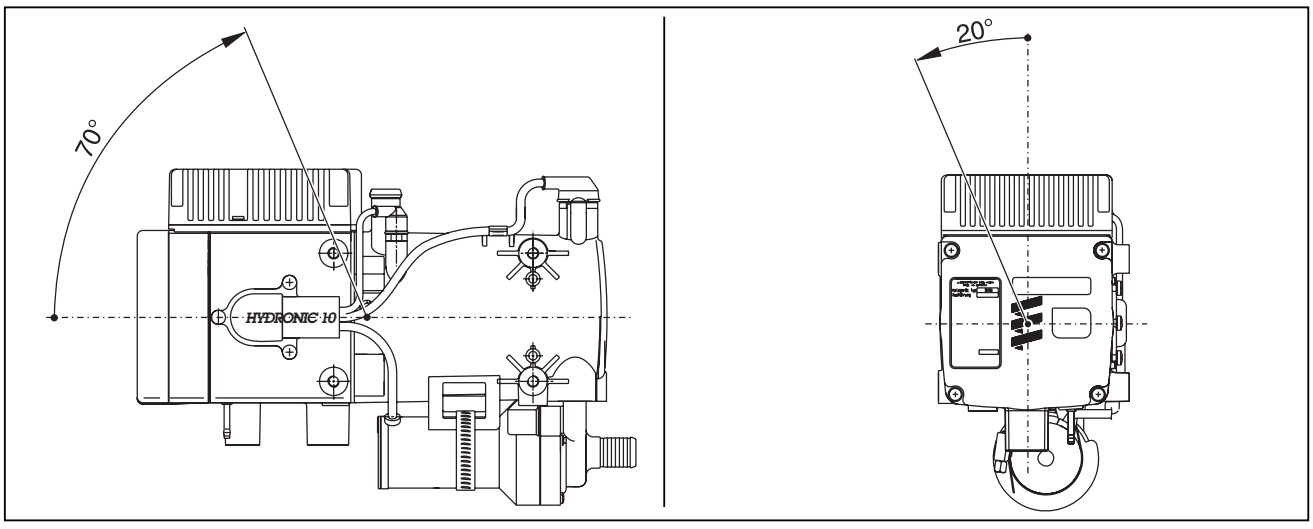


* All measurements in millimeters
25.4 mm = 1”

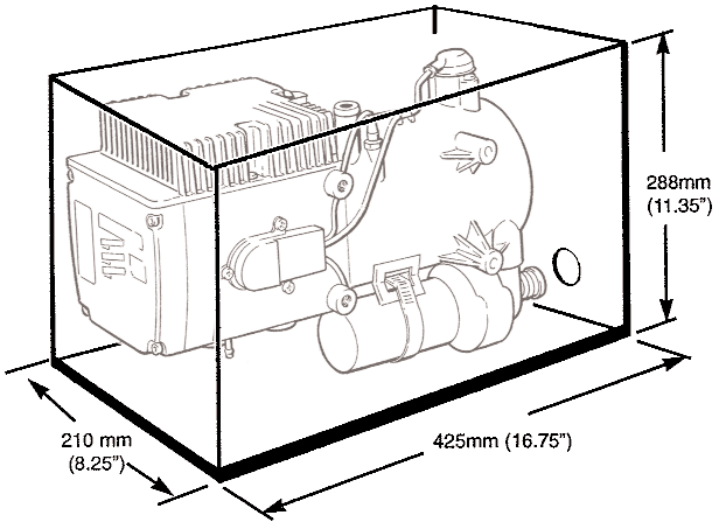
❶ Minimum installation distance (clearance) to open the lid and to dismount the glow pin and the control unit.

❷ Minimum installation distance (clearance) to take in heating air.

Permissible installation positions



Principal Dimensions - Boxed Version

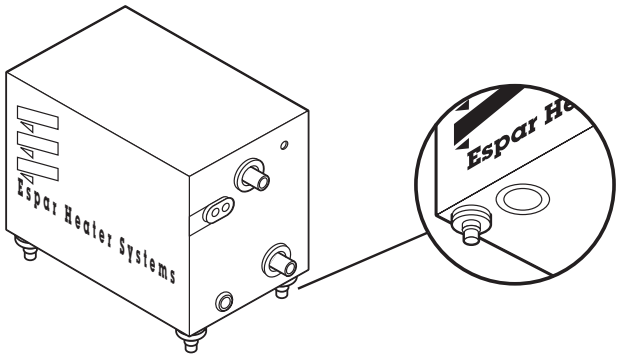


Heater Location

Always mount the heater in a protected area. Eg: storage compartment, engine compartments, step box or battery box. Espar recommends you use the boxed unit. Boxed heaters can be mounted by utilizing one of the existing brackets. See following page.

When mounting the heater adhere to the following conditions:

- Situate the heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.

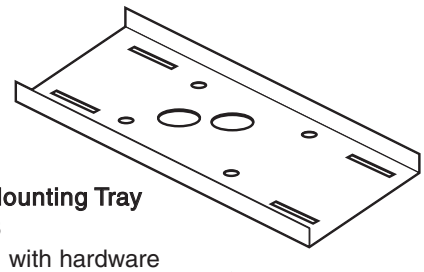


Heater Mounting

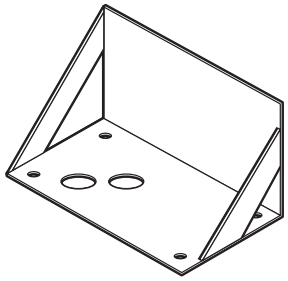
Mount the heater using the four (4) shock mounts provided and one of the following mounting methods:

- Use the **Cross Frame Mounting Tray** to mount the heater behind the cab and on top of the frame rails.
- Use the **Side Mount Bracket** to mount the heater on the side of the frame rail.
- Use a spare step box or battery box.
- Use the saddle bracket and hardware provided

Caution: *Guard the heater against excessive road spray to avoid internal corrosion.*



Cross Frame Mounting Tray
P/N CA0 10 028
P/N CA0 10 022 with hardware



Side Mount Bracket
P/N CA0 10 057

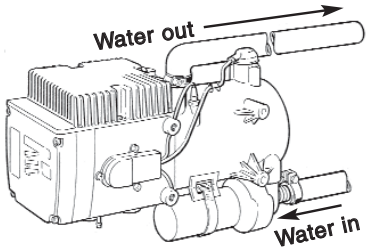
Heater Plumbing

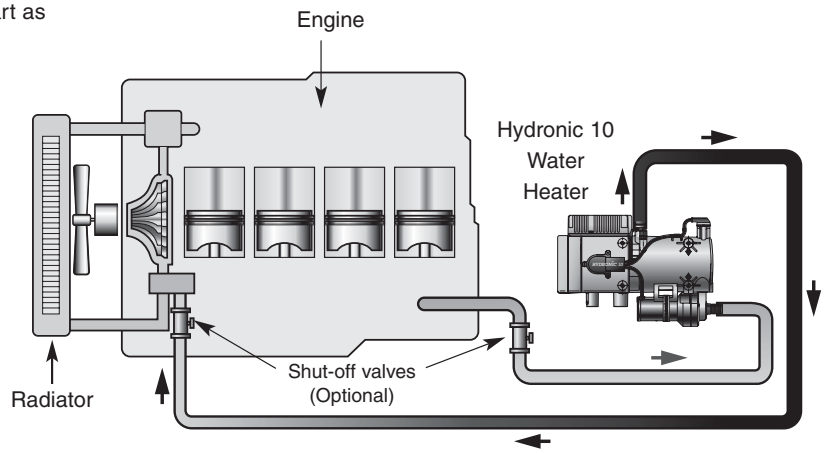
The heater is incorporated into the engine's cooling system for engine preheating

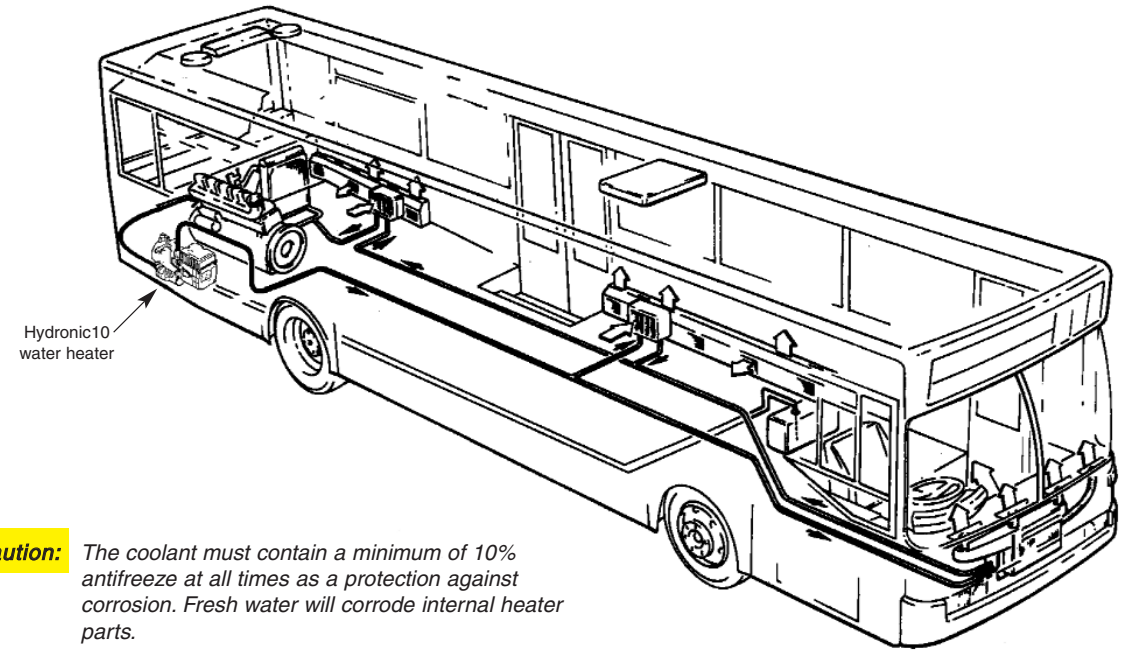
Engine Plumbing

Follow these guidelines and refer to the engine plumbing diagram shown below.

- Install hose fittings into the engine block for pick-up and return lines.
- Use existing holes in the engine block (ie. remove blanking plugs when possible).
- Use shut off valves to ensure the system can be isolated from the engine when not in use. Alternatively "T" piece connectors in existing coolant hoses can be used if no blanking plugs are available
- Provide 20mm (3/4") hose barbs for hose connections.
- Use 20mm (3/4") hoses to ensure adequate coolant flow.
- Keep the pick up and return points as far apart as possible to ensure good heat distribution.
- Take the coolant from a low point on the engine to reduce aeration in the system.
- Ensure proper direction of coolant flow by taking coolant from a high pressure point in the engine and returning it to a low pressure point. (ie. pickup from back of block and return to the suction side of the engine's water pump).
- Ensure adequate flow rate through the heater by comparing the incoming and outgoing coolant temperatures while the heater is running. If the rise in temperature exceeds 10°C (18°F), coolant flow must be increased by modifying the plumbing.
- Ensure the heater and water pump are installed as low as possible to allow the purging of air.
- If a bunk heat exchanger is incorporated into the system, proper plumbing layouts must be followed.







Caution: *The coolant must contain a minimum of 10% antifreeze at all times as a protection against corrosion. Fresh water will corrode internal heater parts.*

Fuel System

The Hydronic 10 boxed unit is most commonly provided with the fuel metering pump mounted inside the box. This is to reduce installation time and to protect the pump from corrosion. If specifications cannot be met the pump must be mounted externally. See illustration for connections and specifications. All parts necessary to do the installation are included in the kit as shown.

Note: Fuel line limits must not be exceeded. Ensure that the following conditions are met.

Bottom of the fuel metering pump must be within a height of 2'6" of the bottom of the fuel pick-up pipe.

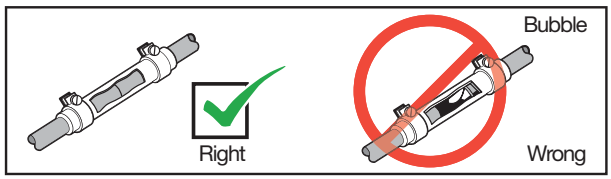
Fuel metering pump must be within a total distance of 6'6" from the fuel pick-up pipe.

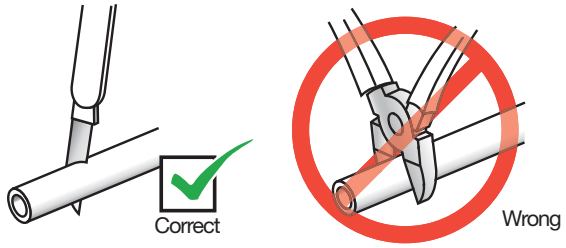
Pressure Runs of less than 1.3 mtrs (50") use only 3.5mm rubber (360 75 300)

Fuel Line

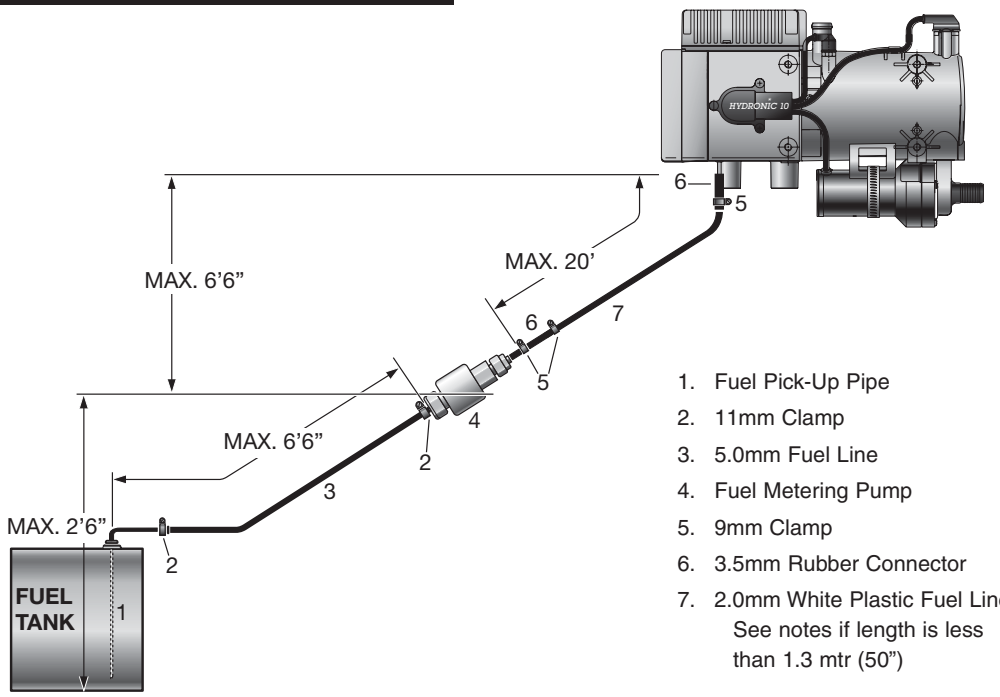
- Route fuel lines from the fuel pick-up pipe to the heater.
- Use fuel lines provided.
- Other sizes or types of fuel lines may inhibit proper fuel flow.
- Make proper butt joints using clamps and connector pieces as shown
- Use a sharp utility knife to cut plastic fuel lines to avoid burrs.

Note: Butt joints and clamps on all connections.





Fuel System Tolerances



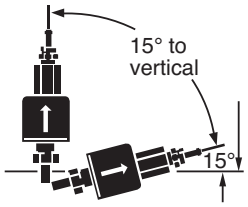
1. Fuel Pick-Up Pipe
2. 11mm Clamp
3. 5.0mm Fuel Line
4. Fuel Metering Pump
5. 9mm Clamp
6. 3.5mm Rubber Connector
7. 2.0mm White Plastic Fuel Line
   See notes if length is less than 1.3 mtr (50")

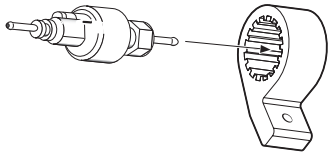
Fuel Metering Pump Installation

If the pump needs to be mounted externally follow these guidelines:

- Choose a protected mounting location close to the fuel pick-up pipe and heater.
- Using the bracket and rubber mount provided, install pump as shown.

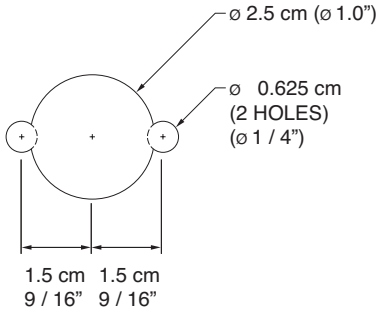
Note: Proper mounting angle of the pump is necessary to allow any air or vapor in the fuel lines to pass through the pump rather than cause a blockage.



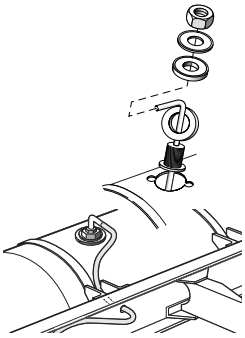


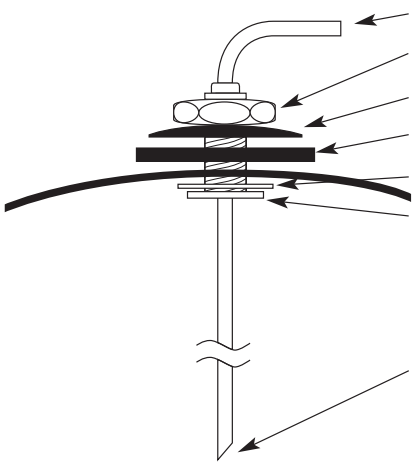
Fuel Pick-Up Pipe Installation (Standard Pick-Up)

- Choose a protected mounting location close to the pump and heater. A spare fuel sender gauge plate provides an ideal mounting location.
- Drill the mounting holes as shown.
- Cut the fuel pick-up pipe to length.
- Mount the fuel pick-up pipe as shown
- Lower the fuel pick-up pipe (with reinforcing washer) into the tank using the slot created by the two 0.6cm (1/4") holes.
- Lift the assembly into position through the 2.5cm (1") hole.
- Assemble the rubber washer, metal cup washer and nut.



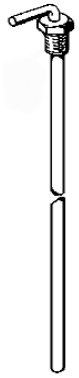
Note: Drill the two (1/4") holes first.





(Optional Pick-Up Pipe with NPT fitting)

- Remove an existing plug from the top of the fuel tank.
- Cut the fuel pick-up pipe to length.
- Secure the fuel pick-up pipe into position using the combined NPT compression fitting as shown



Note: NPT fittings are available in various sizes (Refer to parts section).

Electrical Connections

Caution: *To avoid potential short circuit damage during installation, insert 20 amp fuse into the power harness after all electrical connections are complete.*

Note: All harnesses should be cut to length. All exposed electrical connections should be coated with protective grease.

A) Power Harness.....

Note: Wire must be inserted into fuse holder prior to terminating.

- 2 core harness (red, brown).
- Connect red wire to fuse link and terminal.
- Attach ring terminal to vehicle battery (+).
- Connect brown wire to vehicle battery (-) using ring terminal provided.
- Insert fuse. (15A-24V, 20A-12V)

B) Switch Harness.....

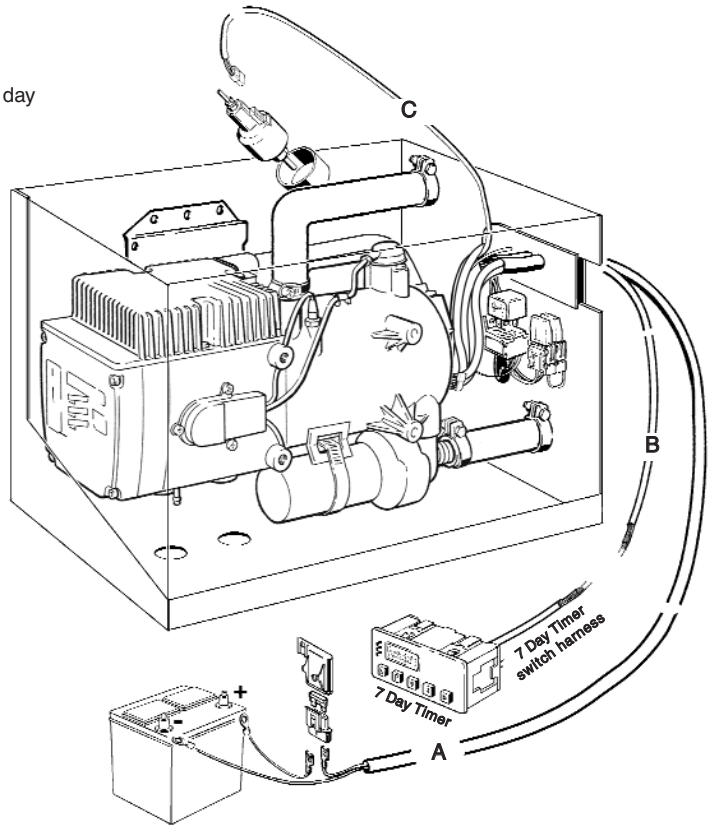
- 4 core harness (red/yellow, brown, yellow, blue/white)
- Run to location of switch. Make terminal connections at switch. Espar has 3 available switches. See switch instructions for more information.

C) Fuel Metering Pump Harness.....

- 2 core harness (green, green).
- Fuel Metering Pump Harness is pre-connected when box is provided with pump pre-mounted.
- If mounted externally, connect wires to fuel metering pump using connector and terminals supplied, boots provided with the heater-(no polarity required).

Shown is a Hydronic 10 boxed version,12 volt with Standard-Power, Switch, Fuel Metering Pump harnesses and optional 7 day timer.

Other timers or switch options are available.



Exhaust Connection

A 30 mm flexible tube exhaust pipe with a length of 1M long is supplied with the kit for the exhaust. An exhaust clamp is needed to secure the exhaust to the the heater. The exhaust hose cannot be any longer than 2 m. Connect the exhaust as follows:

- Connect the exhaust pipe to the exhaust port on the heater and attach with clamp provided. Feed the exhaust pipe through the silicone (white) grommet on the bottom of the box.
- Run exhaust to an open area to the rear or side of the vehicle so that fumes can not build up and enter the passenger compartment or the heater combustion air intake.
- Install exhaust pipe with a slight slope or drill a small hole in the lowest point to allow water to run off. Any restriction in exhaust will cause operational problems.
- Route the exhaust pipe from the heater using holders provided.

Caution: *Run exhaust so that it cannot be plugged by dirt, water or snow. Ensure the outlet does not face into the vehicle slip stream.*

Note: 1. Exhaust hose cannot be any longer than 2m.
2. Minimum lenght 14".
3. **Avoid exhaust lengths of 3.5 to 5 ft long.**

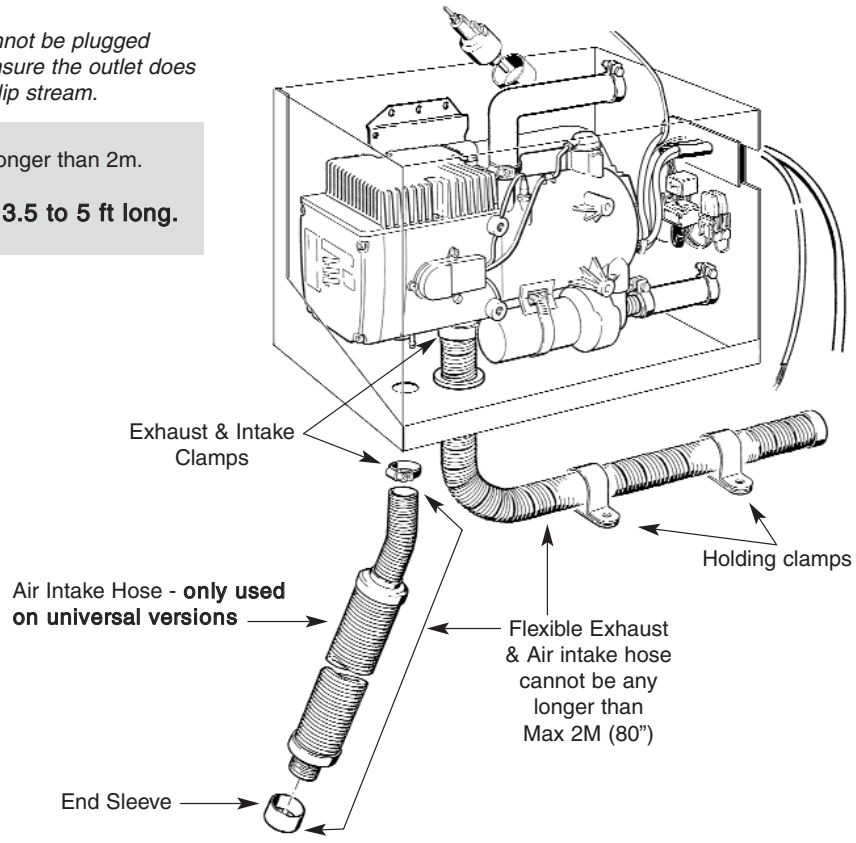
Intake Connection

Universal versions only:

Combustion air must be drawn in from the outside. The combustion air opening must be kept free at all times.

- Connect the air intake pipe to the intake port on the heater and secure with clamp provided.

Caution: *Do not install the intake opening facing the vehicle slipstream. Ensure that the opening cannot become clogged with dirt or snow and that any water entering the intake can drain away.*



⚠ Warning: Asphyxiation Hazard

Route exhaust beyond the skirt of the cab and outside of the frame area. Route exhaust so that the exhaust fumes cannot enter the passenger compartment. Failure to comply with this warning could result in Asphyxiation.

⚠ Warning: Fire Hazard

The exhaust is hot, keep a minimum of 5cm (2") clearance from any heat sensitive material. Failure to comply with this warning could result in serious injury.

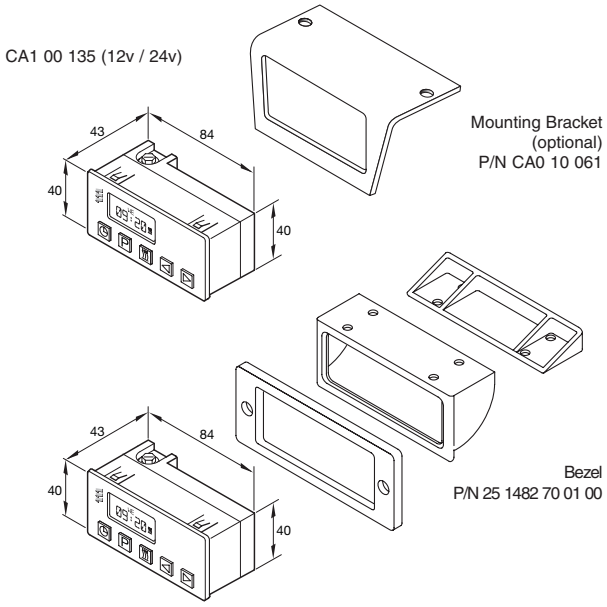
Operating Switches

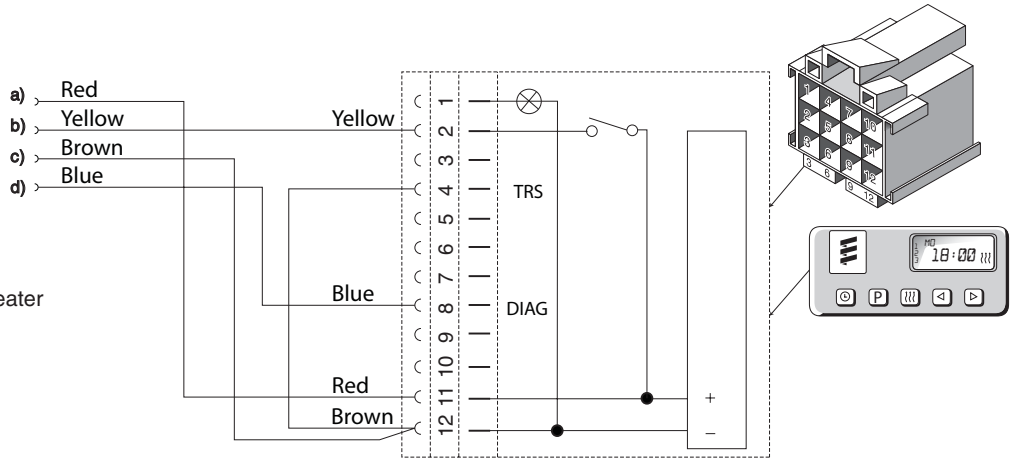
A Push/Pull switch, or a 7 Day Timer are available for the heater. Both are discussed on the following pages. Connect the operating switch as follows.

Multifunction

The 7 Day Timer has been designed to provide a simple means to control the operation of the heater system and to include the capability for diagnostics. This timer connects to the diagnostic circuit of the heater. The timer then displays any heater fault codes in three digit number form automatically. The timer allows for pre-selection of turn on time, up to 7 days in advance, as well as an option for run times up to 2 hours before automatically turning off. In addition, there is an on/off switch for manual operation. By default the timer is pre-set by Espar to operate for two hours. Refer to instructions provided with timer for setting options.

- Mount bezel into dash and insert timer or use Espar's optional mounting bracket and secure to dash.
- Use hardware supplied for connections.
- Connect the switch harness to the connector at the heater and run harness to switch location. (Harness should be neatly routed and secured under dashboard).
- Cut harness to length and terminate wires. Attach using connectors provided.
- Refer to timer instructions for other wiring options.





a) Power from battery "+"
b) Switch control to the heater
c) Power from battery "-"
d) Diagnostic from heater

Note: If installing a remote starter, refer to remote starter instructions before terminating wires.

Option #1: Dash lights to timer - connect wire between dash lights circuit and timer at terminal #1.

Note: The timer display is automatically illuminated while the heater is operating. Connecting the grey wire to the vehicle dimmer switch will allow the timer display to illuminate with the vehicles dash lights.

Option #2: Operate heater continuously - connect wire from ignition circuit to terminal #10. See also multifunction (7 day) timer in instructions.

Note: An alternative to connecting the black wire to the vehicle ignition accessories "On" circuit may also be considered for some applications where extended run times are desired. Connecting the black wire with the red wire will enable the heater to run continuously whether the heater is switched on manually or through the preset function.

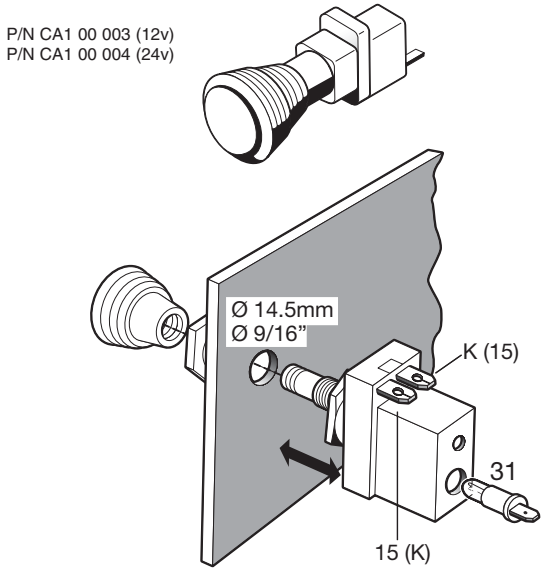
Installation Procedures

Push/Pull Switch

- Mount switch in a location where it is easily accessible
- Mount using hardware supplied
- Connect the switch harness to the connector at the heater and run the harness to the switch location
- Cut harness to length at the switch and install terminals
- Connect wiring as described below

Note: Wired described the switch light glows when pulled out and is off when pushed in.

Brown- 31	Power from battery "-"
Red- K(15)	Power from battery "+"
Yellow-15(K)	Switch control to the heater
Blue/White	Diagnostic from heater (disregard - tape end and tie off to the side)

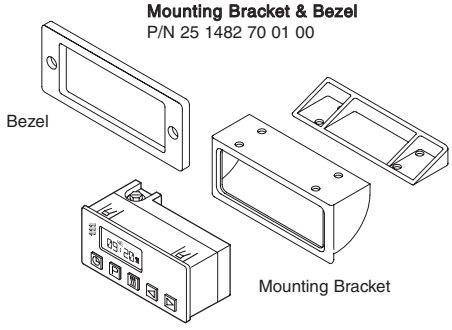


7 Day Timer Instructions

The 7 Day Timer has been designed to provide a simple means to control the operation of the heater system and to include diagnostics capability. This timer connects to the diagnostic circuit of the heater. The timer then displays any heater fault codes in three digit number form automatically. The timer allows for pre-selection of turn on time, up to 7 days in advance, as well as an option for run times up to 2 hours before automatically turning off. In addition, there is an on/off switch for manual operation. By default the timer is pre-set by Espar to operate for two hours.

1 Mount bezel into dash and insert timer or use Espar s optional mounting bracket and secure to dash.
2 Use hardware supplied for connections.
3 Connect the switch harness to the connector at the heater and run harness to switch location. (Harness should be neatly routed and secured under dashboard).
4 Cut harness to length and terminate wires. Attach using connectors provided.

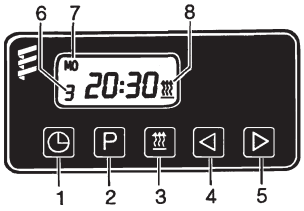
Mounting Bracket & Bezel
P/N 25 1482 70 01 00



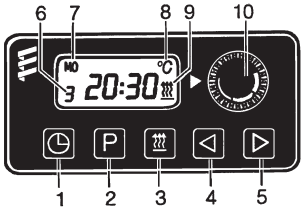
Operating Instructions

1 Time set
2 Preheat time set
3 Heater "On"
4 Backward scan
5 Forward scan
6 Memory location
7 Time and day display
8 Air temperature display (optional)
9 Heater "On" symbol
10 Temperature set (air heater only)

Coolant Heater



Air Heater



Note: Upon connection to power the entire timer display will begin to flash. The heater will not function until the time is programmed.

Setting Time and Weekday

Push ◷ button once. 12:00 will begin to flash (this will occur upon initial hook up to power).
Using ◁ or ▷ set the present time of day (24 hour clock).
When the time stops flashing the time has been stored.
The weekday will now begin to flash.
Use ◁ or ▷ to set the present weekday.
When the weekday stops flashing the weekday has been stored.
When the vehicle ignition is turned "on" the time display will appear
When the vehicle ignition is turned "off" the timer display will go off . after 15 seconds.

7 Day Timer Instructions

Changing the Time or Day

Push and hold ◷ button until the time display begins to flash.
Continue to set the time as listed in setting time and weekday.

Using the Timer with the Vehicle Ignition "Off"

Push ≋ button.
≋ will appear on the display as well as the operation countdown timer.
The running time is factory set to a maximum of 120 minutes. This running time can be reset once or permanently as desired.

Adjusting Preheat Time Once

Press ≋ button.
The ≋ will appear in the display and the preselected run time will appear in the display (maximum time of 120 minutes).
Use the ◁ or ▷ to adjust the desired run time.

Adjusting the Heater Preheat Time Permanently
(Maximum Preheat Time of 120 minutes)

Push ◁ and hold (about 3 seconds) until the display lights up and flashes. Release button.
Use ◁ or ▷ to set the new fixed preheat time.
When the display goes off the new preheat time is set.

Note: At the end of a preheat cycle the timer will turn the heater off. The heater will complete a cool down cycle and turn itself off.

Using the Heater Manually with the Vehicle Accessory "On"

Push ≋ button.
The ≋ symbol will appear in the display next to the time of day.
The time of day will remain displayed during ignition on operation.
The heater will function continually as long as the vehicle ignition is "on".
When the vehicle ignition is turned "off" the heater will continue to operate for an addtional 15 minutes.
The run time can be altered by pressing the ◁ or ▷ buttons.
The heater can be turned off by pressing ≋ button.

Set Preheat Times into Memory

Press P button until the desired memory location is shown in the display (Three memory locations are available).
Using the ◁ or ▷ buttons set the desired preheat start time of day.
When the time stops flashing the time of day is set.
Using the ◁ or ▷ buttons set the desired day of the week.
When the day of the week stops flashing the day is set.

To Use Preset Start Times

Press the P button until the desired memory location appears in the display.
The heater will start at the day and time displayed.
The display will go off in 15 seconds. The memory location number will stay displayed (1, 2 or 3).
Note: When preset is chosen ≋ this symbol will flash red.

To Turn Heater "Off" - All Modes

Press the ≋ button once.
The heat signal to the heater will be turned "off".
The heater will do a normal cooldown and turn itself "off".

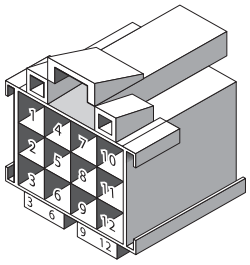
Note: When the vehicle ignition is turned "on" the time of day and day of the week will appear in the timer display. This will stay on as long as the vehicle ignition is "on".

Note: When the vehicle lights are turned "on" the timer backlight will come "on" also.

Note: An outside temperature sensor is available as an option

Wiring Connections at connector

Terminal 1	Power from vehicle dash lights - grey wire
Terminal 2	Heater switch wire - yellow wire
Terminal 4	Connect to vehicle ground - brown wire
Terminal 6	Temperature setting "+" **(air only)** - grey/red wire
Terminal 8	Heater diagnostic lead - blue wire or blue/white wire (air)
Terminal 9	Temperature setting "-" **(air only) -** brown/white
Terminal 10	To vehicle "ACC" accessory for continuous overnight use
Terminal 11	Positive power from heater - red "+"
Terminal 12	Ground lead from heater - brown "-"
Terminal 3,5,7	Left blank, not required



Notes

Pre-Start Procedures

Upon completion of installation prepare the heater as follows:

- Check all fuel, electrical and plumbing connections.
- Refill the engine coolant.
- Bleed air from the coolant system by running the engine and refilling the antifreeze as needed. Resecure heater hose.
- Run engine to further bleed the system
- Top up engine coolant.

Start Up

Once switched on, the following sequence occurs:

- Control unit does a systems check (flame sensor, temperature, safety thermal sensor and various other control unit checks).
- Water pump starts circulating coolant fluid.
- Combustion air blower starts.
- Glow pin begins to preheat 20-30 secs.
- After about 20-30 seconds the Fuel Metering Pump starts delivering fuel and the combustion air blower ramps up gradually.
- Once ignition takes place the flame sensor alerts the control unit and the control unit shuts off the glow pin (ignition time: 1.5 - 2 minutes).

Note: If the heater fails to start the first time it will automatically attempt a second start. If unsuccessful the heater will shut down completely.

Note: On initial start up the heater may require several start attempts to self prime the fuel system.

Running

Once ignition is successful the following operations take place:

- Heater runs in full heat mode and the temperature is monitored at the heat exchanger.
- Once the coolant reaches 72°C (162°F) the heater will start to cycle down between levels (High,Medium,Low).
- If the coolant temperature continues to rise, the heater will automatically switch off. This occurs when temperature reaches 85°C (185°F).
- The water pump will continue to circulate coolant to allow the heater to monitor engine temperature
- The heater will automatically re-start once coolant temperature reaches 68°C (154°F).
- The heater continues to run as described above until it is switched off, either manually, automatically by a timer or heater malfunction shutdown.

Note: If the heater should flame out while in running mode, it will automatically attempt one restart. If successful it will continue to run, if not it will turn itself off.

Note: During operation the heater continually senses the input voltage from the batteries, if the input voltage drops to approximately 10.5V (20V on a 24 volt system) or rises above 15V (30V on a 24 volt system) the heater will automatically shut down.

Switch Off

- When the heater is switched off, manually or automatically, it starts a controlled cool down cycle.
- The fuel metering pump stops delivering fuel and the flame is extinguished.
- The combustion air blower and water pump continue to run for 130 seconds to cool down.
- The heater shuts off.

Safety Equipment

The control unit, overheat sensor and flame sensor continually monitor heater functions and will shut down the heater in case of a malfunction.

- The control unit ensures electrical circuits (fuel pump, combustion air blower etc.) are complete prior to starting the heater.
- If the heater fails to ignite within 90 seconds of the fuel pump being started, the starting procedure will be repeated. If the heater again fails to ignite after 90 seconds of fuel being pumped, a “no start safety shutdown” follows.
- If the heater flames out during operation, the heater automatically attempts to restart. If the heater fails to ignite within 90 seconds of fuel delivery, or ignites but flames out again within 10 minutes, “flame out” shutdown follows. After troubleshooting the problem, the heater can be started again by switching the heater off and then back on.
- Overheating due to lack of water, a restriction or a poorly bled coolant system results in an “overheat shut down”.
- If at any time the voltage drops below 10.5V (20V on a 24 volt system), or rises above 15V (30V on a 24 volt system), a “high/low voltage” shutdown follows (after a 20 second delay).

⚠ Warning:

The heater must be switched off while any fuel tank on the vehicle is being filled.

The heater must not be operated in garages or enclosed areas.

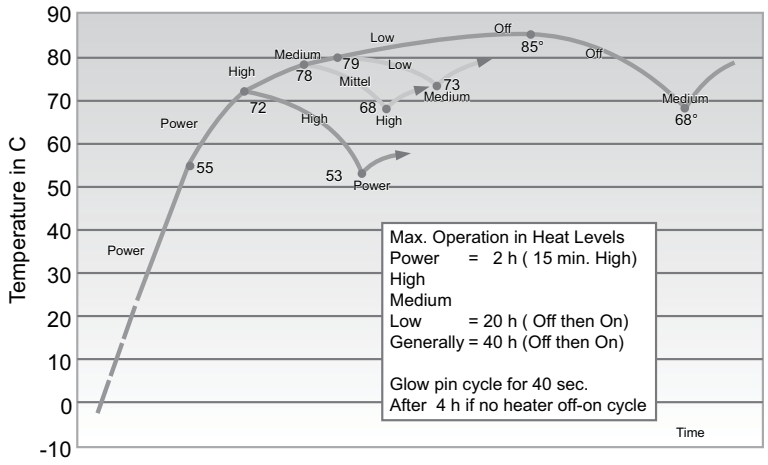
Heater Operation

Operational Flow Chart

	STARTING PHASE					RUNNING PHASE	SHUT DOWN PHASE		
Operating Mode	System Check	Pre-heat	Ignition Attempt	Pre-heat 2nd. attempt	Ignition Attempt 2nd. attempt	Controlled Heating	After Glow	Cool Down	Off or Stand by
Water Pump	Off	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off **On**: if in stand by
Blower	Off	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off
Glow Pin	Off	**On**	**On**	**On**	**On**	Off	**On**	Off	Off
Fuel Pump	Off	Off	**On**	Off	**On**	**On**	Off	Off	Off
Time	1- 3 sec.	80 sec.	Up to 90 sec.	80 sec. If Required	Up to 90 sec.	High/Low Operation until switched off manually or automatically	20 sec.	2.5 min.	

Note: During the controlled heating cycle, if the coolant temperature exceeds 85°C(185°F) the heater will cycle off. Heater will automatically restart in high mode once coolant temperature reaches 68°C(154°°F)

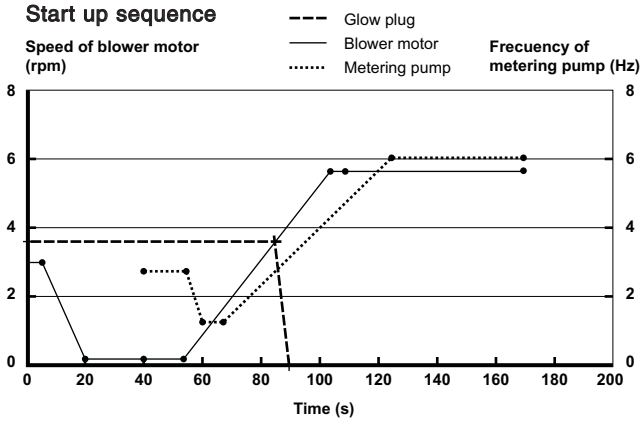
Coolant Temperature Control Profile



Operation Profile

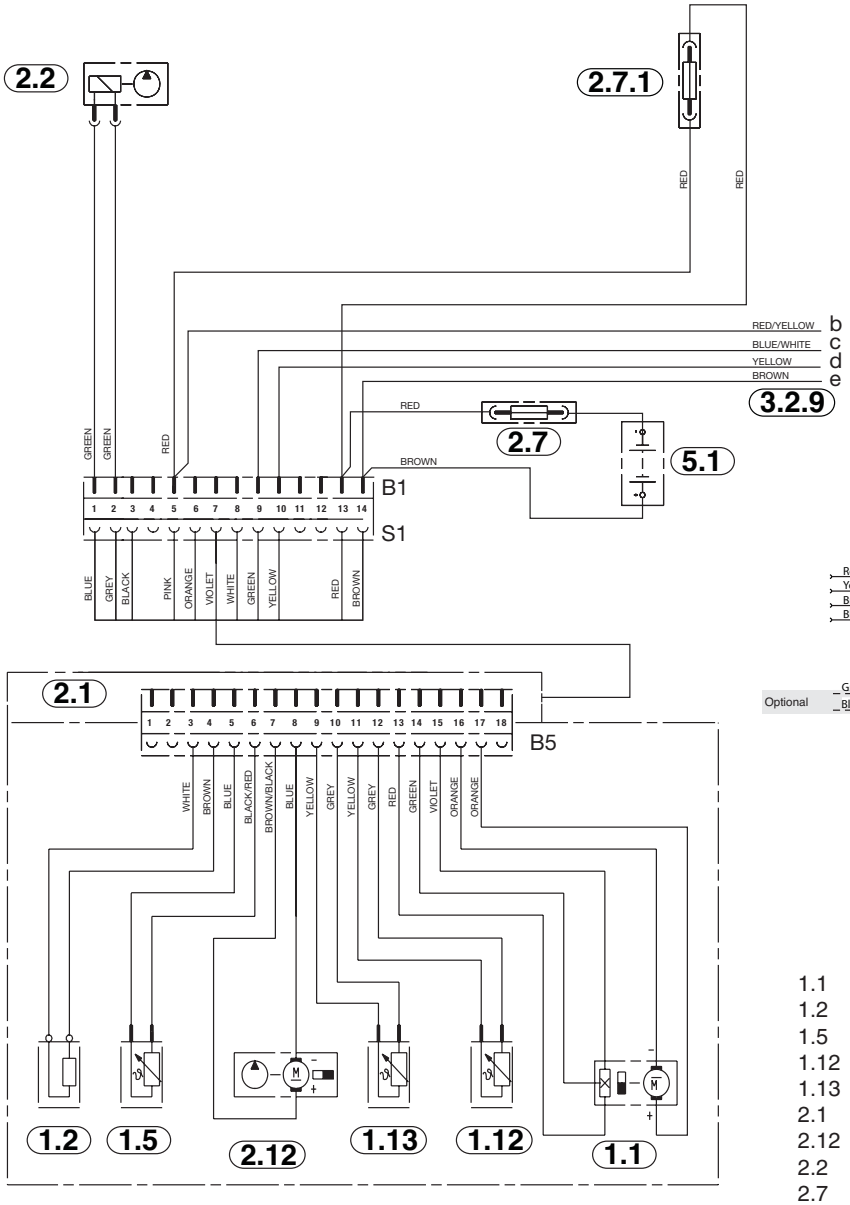
Control temperatures		Speed of blower motor
Vehicle Blower On	55°C	Power - 7300 rpm
Power - High	72°C	High - 5600 rpm
High - Medium	78°C	Medium - 3000 rpm
Medium - Low	79°C	Low - 1800 rpm
Low - Off	85°C	
Off - Medium	68°C	
Medium - High	68°C	
Low - Medium	73°C	
High - Power	53°C	

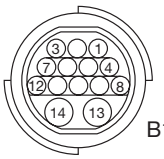
Start up sequence

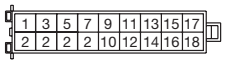


Hydronic 10 Wiring Diagram - 12 Volt + 24 Volt

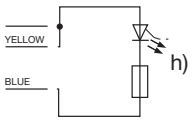
25 2081 05 - 12V
25 2044 05 - 24V



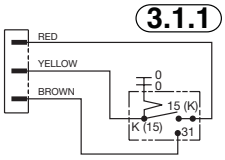




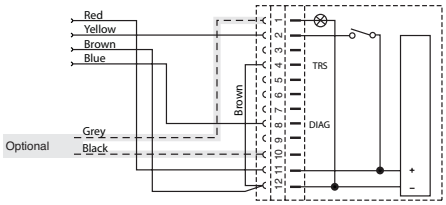
Diagnostic LED



Push/Pull switch 3.1.1



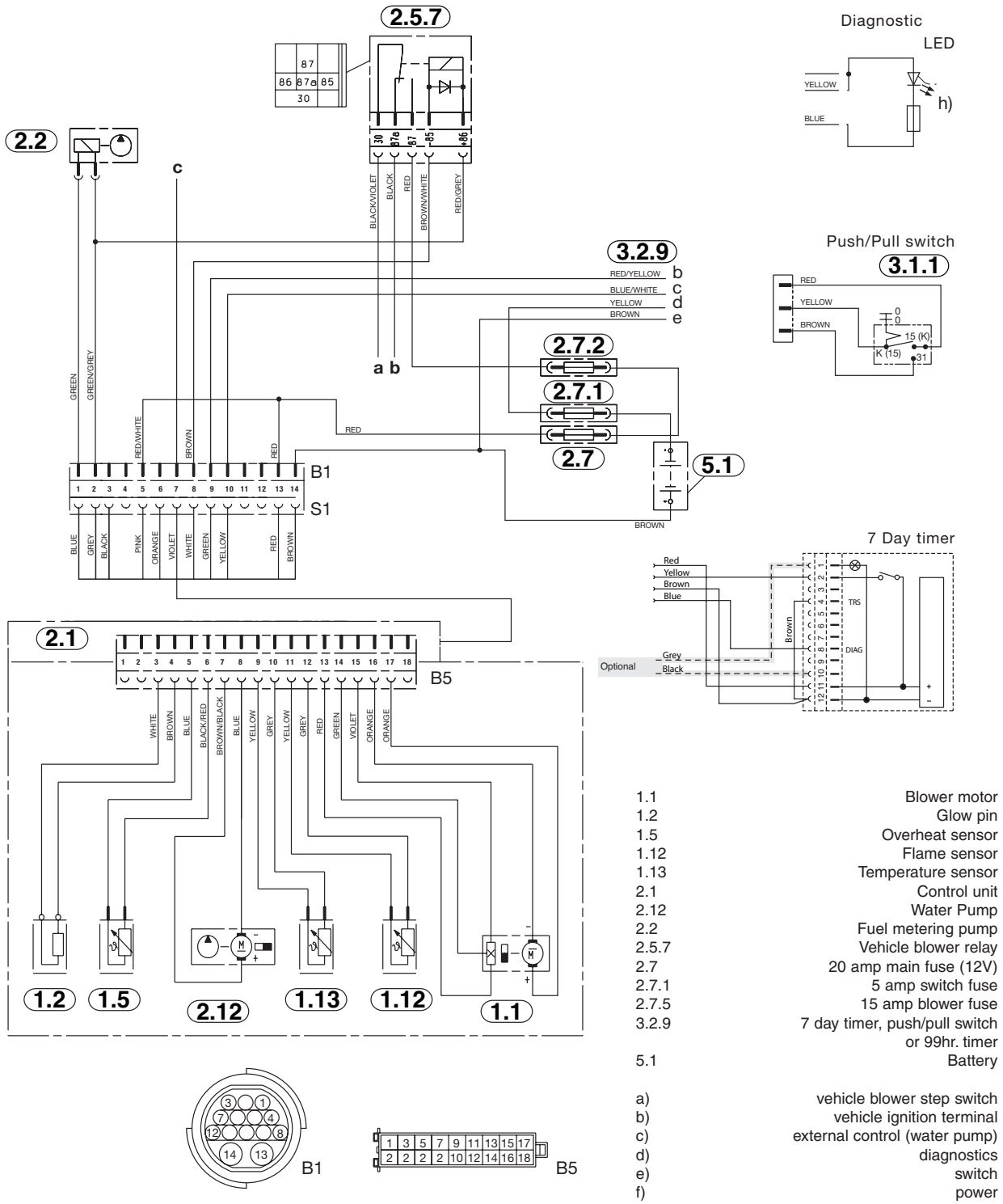
7 Day timer



1.1	Blower motor
1.2	Glow pin
1.5	Overheat sensor
1.12	Flame sensor
1.13	Temperature sensor
2.1	Control unit
2.12	Water Pump
2.2	Fuel metering pump
2.7	20 amp main fuse
2.7.1	5 amp switch fuse
3.2.9	7 day timer, push/pull switch or 99hr. timer
5.1	Battery
a)	Optional - supply for vehicle blower
b)	Power
c)	Diagnostics
d)	Switch
e)	Ground
h)	Optional - LED for flashing code

Hydronic 10 Wiring Diagram - 12 Volt + 24 Volt - Universal Harness

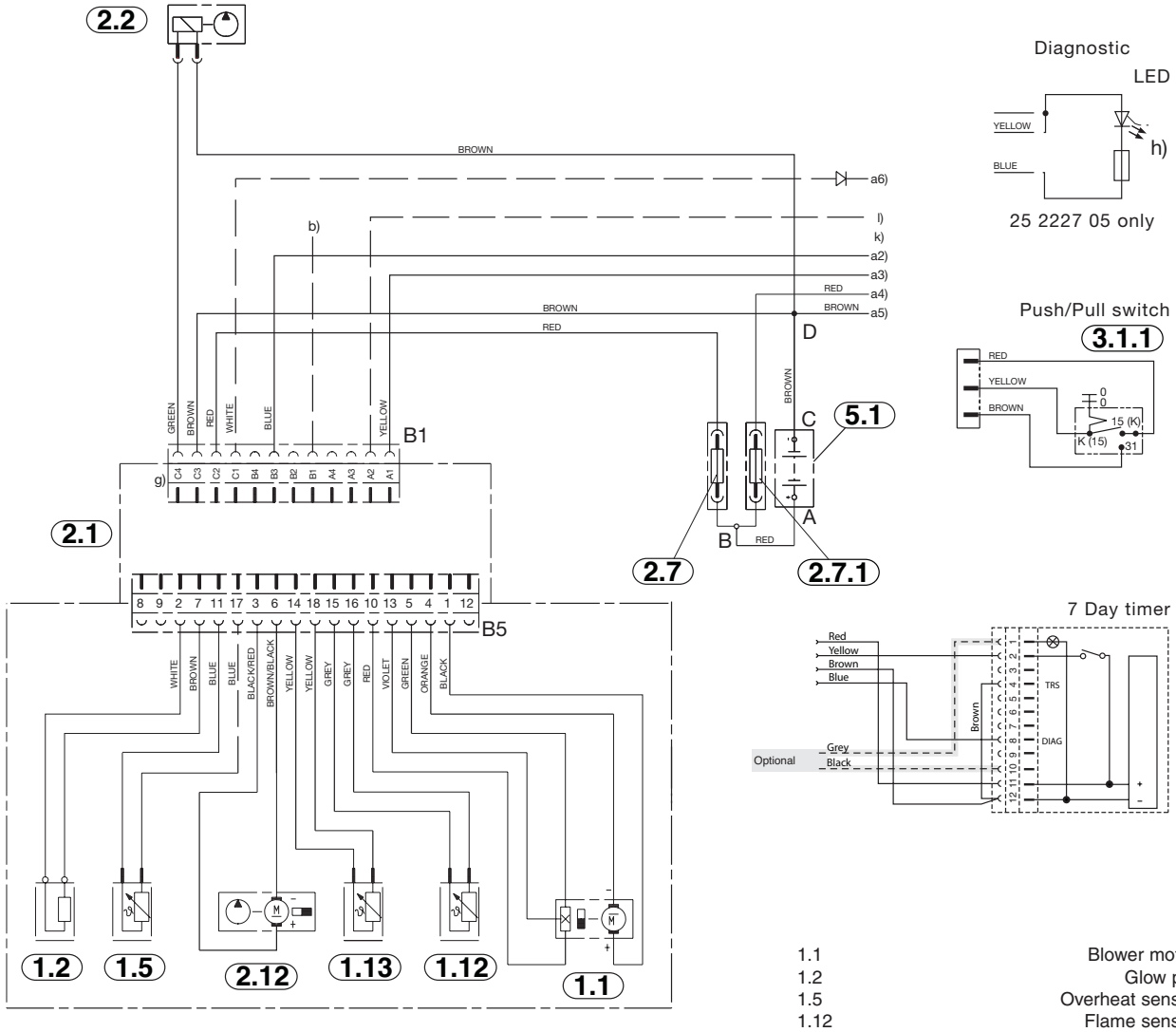
25 2081 05 - 12V
25 2044 05 - 24V



1.1	Blower motor
1.2	Glow pin
1.5	Overheat sensor
1.12	Flame sensor
1.13	Temperature sensor
2.1	Control unit
2.12	Water Pump
2.2	Fuel metering pump
2.5.7	Vehicle blower relay
2.7	20 amp main fuse (12V)
2.7.1	5 amp switch fuse
2.7.5	15 amp blower fuse
3.2.9	7 day timer, push/pull switch or 99hr. timer
5.1	Battery
a)	vehicle blower step switch
b)	vehicle ignition terminal
c)	external control (water pump)
d)	diagnostics
e)	switch
f)	power
g)	ground
h)	LED for flashing code

Hydronic M Wiring Diagram - 12 Volt and 24 Volt - Engine Heat Only

25 2160 05 - 12V
25 2227 05 - 24V



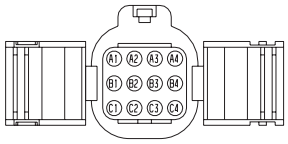
Diagnostic LED

25 2227 05 only

Push/Pull switch 3.1.1

7 Day timer

B1



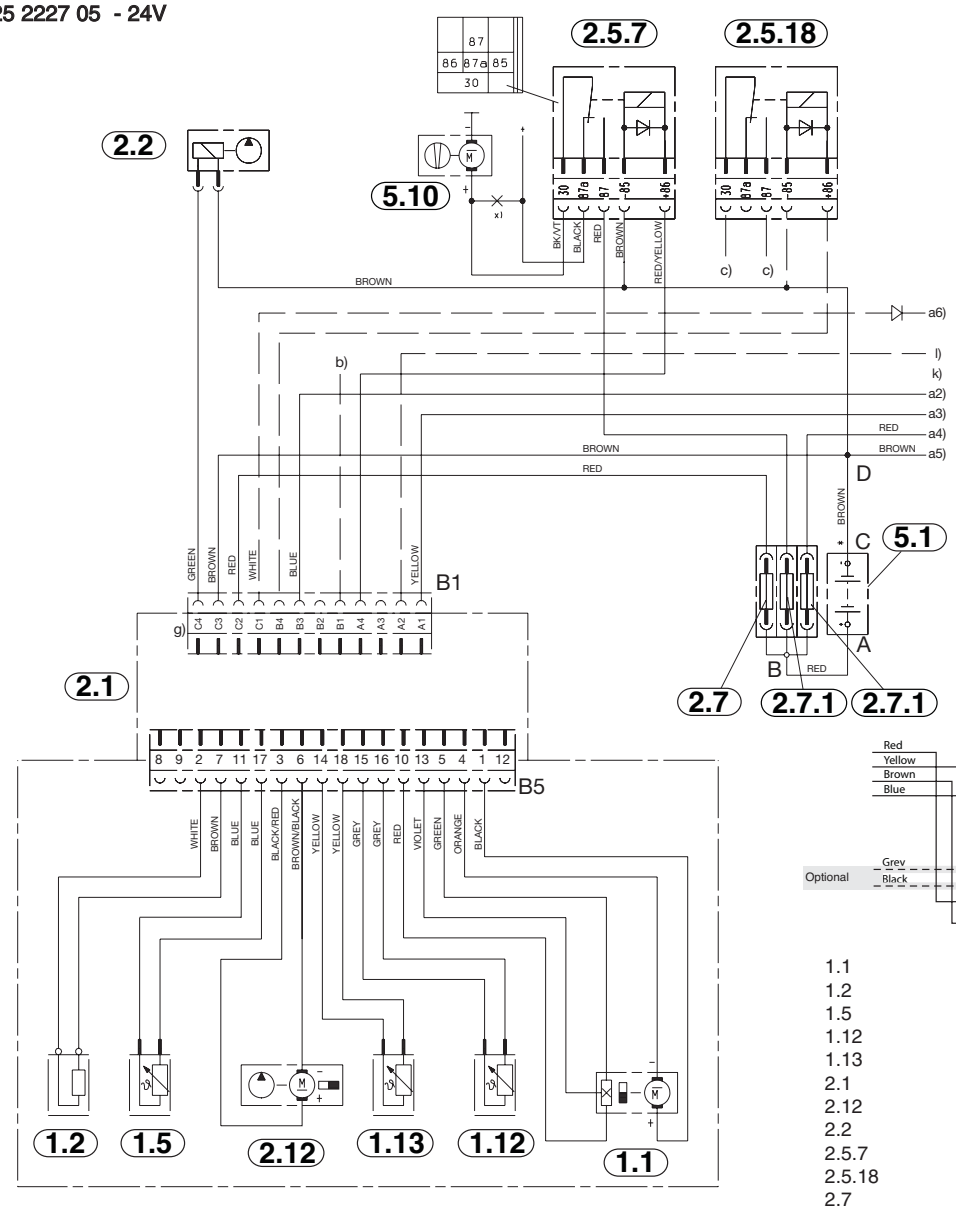
B5

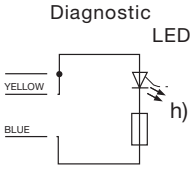
B3

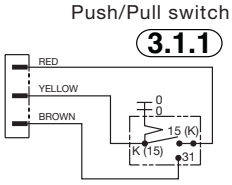
1.1	Blower motor
1.2	Glow pin
1.5	Overheat sensor
1.12	Flame sensor
1.13	Temperature sensor
2.1	Control unit
2.12	Water Pump
2.2	Fuel metering pump
2.7	20 amp main fuse (12V)
2.7.1	5 amp switch fuse
3.2.9	7 day timer, push/pull switch or 99hr. timer
5.1	Battery
a)	vehicle blower step switch
b)	vehicle ignition terminal
c)	external control (water pump)
d)	diagnostics
e)	switch
f)	power
g)	ground
h)	LED for flashing code

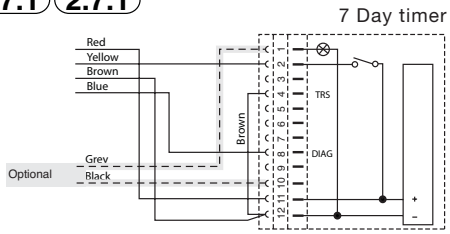
Hydronic M Wiring Diagram - 12 Volt and 24 Volt - Universal Harness

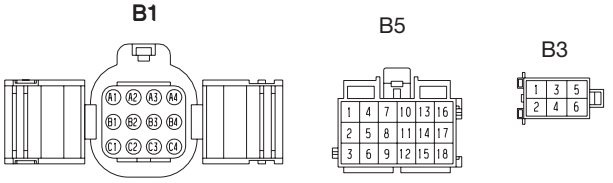
25 2160 05 - 12V
25 2227 05 - 24V











1.1	Blower motor
1.2	Glow pin
1.5	Overheat sensor
1.12	Flame sensor
1.13	Temperature sensor
2.1	Control unit
2.12	Water Pump
2.2	Fuel metering pump
2.5.7	Vehicle blower relay
2.5.18	Relay, changeover water circuit.
2.7	20 amp main fuse (12V)
2.7.1	5 amp switch fuse
2.7.5	15 amp blower fuse
3.2.9	7 day timer, push/pull switch or 99hr. timer
5.1	Battery
5.10	Vehicle fan
a)	vehicle blower step switch
b)	vehicle ignition terminal
c)	external control (water pump)
d)	diagnostics
e)	switch
f)	power
g)	ground
h)	LED for flashing code

Periodic Maintenance

- Check coolant hoses, clamps, and make sure all valves are open. Maintain the engine manufacturers recommended coolant level and ensure that the heater is properly bled after service on or involving the coolant system.
- Visual check of all fuel lines for leaks. Check and if necessary replace fuel filter inserts.
- Visual check of electrical lines and connections for corrosion.
- Run your heater at least once a month during the year (for a minimum of 15 minutes).
- Maintain your batteries and all electrical connections in good condition. With insufficient power the heater will not start. Low and high voltage cutouts will shut the heater down automatically.
- Use fuel suitable for the climate (see engine manufacturers recommendations). Blending used engine oil with diesel fuel is not permitted.

Troubleshooting

Basic Troubleshooting

In the event of failure there are several items which should be checked first before any major troubleshooting is done. ***Check:***

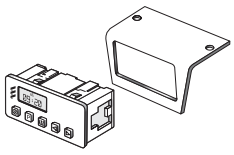
- Fuses.
- Electrical lines and connections
- Interference in Combustion air and Exhaust pipes.
- Fuel in the tank.
- Battery voltage
- Coolant flow

Self Diagnostics

The heater is equipped with self diagnostic capability. You can retrieve information on the heaters last 5 faults using the Espar 7 day timer or Espar's Fault Code Retrieval Device.

Multifunction

Espar's 7 day timer has a fault code retrieval device built into the unit. This function automatically activates if the heater is experiencing problems.

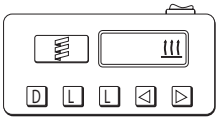


- Fault codes appear on the LCD display screen
- Codes can then be translated from the charts on the following pages.
- See instruction sheet that comes with the timer

Fault Code Retrieval Device

Equipment Face and Controls

Symbols seen on the display face are as follows:



AF Actual fault.

F1-F5 Up to five stored faults can be accessed. The AF and F1 are the same number.

This sign is displayed when the heater is in operation.

DIAG The word (Diagnostic) will come on when the diagnostic number is requested.

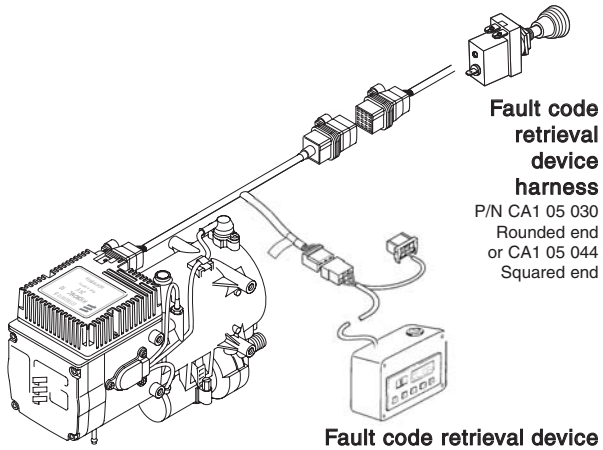
000 Three digit diagnostic fault code number.

Hook Up

- Disconnect the main harness from heater and insert adapter cable harness between them
- Connect adapter cable to the cable loom of the Fault code retrieval device
- Start diagnostic unit - switch heater on from switch

Instructions:

- Switch the fault code retrieval device on and wait 10 seconds.
- Press the "D" button.
- Wait 3-5 seconds for the current fault code to appear (AF).
- To review the previous faults use the arrow buttons (F1= Most Recent, F5= Oldest).
- To erase the faults that are in memory press both "L" keys at the same time.
- See the fault code chart on following pages for code number descriptions.



Fault code retrieval device harness
P/N CA1 05 030
Rounded end
or CA1 05 044
Squared end

Fault code retrieval device
P/N CA1 05 020

Fault Code	Fault Description	Causes / Repair	Fault Signal / Flashing Code
000	Normal Operation		
001	Advanced warning - overvoltage	Check to see if voltage between pins 13 and 14 of control unit (external plug) is greater than 15 V or 30V.	
002	Advanced warning - undervoltage	Check to see if voltage between pins 13 and 14 of control unit(external plug) is less than 10 V or 20V	
010	Overvoltage shutdown charging system.	Check voltage between pins 13 and 14 at the control unit (external plug) is greater than 15 V or 30V. Check vehicle	
011	Under voltage shut down	Check voltage between pins 13 and 14 at the control unit (external plug) is less than 10 V or 20V. Check batteries and connections.	
012	Overheating	Check for possible causes of overheat, check water through flow (water circuit), sensor. Temperature at temperature sensor is greater than 115°C. Impedance at temperature sensor < 400Ω. Check difference at the control unit, dismantle the control unit, disconnect the internal plug from the control unit and measure the difference between pins 5 and 8. Overheat sensor values: 150 kohms at -25°C 10 kohms at +25°C.	
013	Excessive temperature at flame sensor	Flame sensor signals temperature of greater than 700°C. Difference at flame sensor > 3400 ohms. Check the impedance at the control unit (internal plug), dismantle the control unit, disconnect the internal plug from the control unit and measure the impedance between pins 10 and 12. Flame sensor values: 900 ohms at -25°C 1100 ohms at +25°C.	
014	Possible overheating detected	Difference of measured values at temperature sensor >70°C (difference evaluation) Check temperature sensor and overheating sensor, open heater slide valve and check water throughflow. Check the impedance between 5 and 8 at the control unit (internal plug). Over temperature sensor values: 150 kohms at -25°C 10 kohms at +25°C.	

Fault Code	Fault Description	Causes / Repair	Fault Signal / Flashing Code
015	Too many overheats	The control unit is interlocked after three successive overheats (error codes 012, 013 and 014). Eliminate the case of the overheat. Cancel the interlock by clearing the error memory with the diagnostic unit/PC.	
020 021	Open circuit - glow pin Short circuit - glow plug	Check glow pin (nominal value: 2 ohms), replace if necessary. Check pin 4(white) on the control unit (internal plug) leading to glow plug to terminal 3 (brown) for continuity/short-circuit. If O.K.-> replace control unit.	
033	Combustion air blower motor	Speed deviation for longer than 60 seconds. Nominal values: 5600 rpm (full-load), 1850 rpm (part load) * Check burner motor: apply supply voltage to motor. Connect + to 1.5 black and - to 1.5 orange. Motor does not turn —> replace burner motor with integrated sensor. * Check sensor supply. Switch on heater and measure voltage between output 13 (0.25 red) and 14 (0.25 green) at the control unit (internal plug). Nominal value: 8 V. If deviation —> replace control unit. * Check sensor: Measure voltage between terminal 15 (0.25 violet) and 14 (0.25 green) with an analog voltmeter when the blower is running. Nominal value: 4 V (+ 0.3 V) average value (8 V square-wave signal). If deviation —> replace motor with integrated sensor. If sensor signal is O.K., then the speed controller is defective —> Change control unit.	
037 042	Water pump is not working Water pump short-circuit	Check water pump (driven externally). Check water pump and leads.	
043	Short circuit at external components	Check terminal 2 (1 green) of control unit (external plug) for short-circuit. Check connected components (max. current 6A), replace them if necessary.	
047 048	Short circuit - fuel metering pump Open circuit - fuel metering pump	Check terminal 1 (1 blue) of control unit (external plug) and leads up to metering pump for short-circuit/ interruption. Check the metering pump. Nominal value: approx. 20 ohms. Replace if necessary.	

Fault Code	Fault Description	Causes / Repair	Fault Signal / Flashing Code
050	Too many no start attempts	The control unit is interlocked after it has been switched on 10 times in succession (=20 failed starts) without flame detection (fault code 052). Check the fuel supply, glow plug, exhaust piping, combustion air piping and flame sensor. Cancel the interlock by clearing the error memory with the diagnostic unit/PC.	
051	Faulty flame recognition	Flame sensor signals a temperature of greater than 80ºC despite 4 minutes of cooling with cold air. Impedance at flame sensor > 1300 ohm. If no combustion takes place —> check the flame sensor, replace it if necessary. Flame sensor values:900 ohms at -25°C, 1100 ohms at +25°C.	
052	No start safety time exceeded	No flame was detected during the start-up phase. Flame sensor value of less than 90∞C (1350 ohms). Check the fuel supply, glow plug, exhaust piping, com bustion air piping and flame sensor. Flame sensor values: 900 ohms at -25°C, 1100 ohms at +25°C.	
053 054 056 056	Flame cutout in boost mode Flame cutout in high mode Flame cutout in medium mode Flame cutout in low mode	Heater has started (flame detected) and indicates flame loss in a power setting. Check fuel flow rate, blower speed, fuel supply, exhaust pipe and combustion air piping. If combustion is O.K., check flame sensor, replace if necessary. Flame sensor values:900 ohms at -25°C, 1100 ohms at +25°C.	
059	Water temperature rises to quickly	Check water circulation (012) and temperature control sensor (060/061).	
060 061	Temperature control sensor interruption Short circuit - temperature control	Control sensor signals temperature value outside measurement range. Check the connecting leads (0.35 yellow). For this purpose, dismantle the control unit, disconnect the internal plug from the control unit and measure the impedance between 9 and 11. Impedance between terminals 9 and 11 of the control unit (internal plug): greater than 10 kohms (in the event of interruption) less than 100 ohms (in the event of short circuit).Temperature sensor values: 650 ohms at -25°C, 1000 ohms at +25°C.	

Fault Code	Fault Description	Causes / Repair	Fault Signal / Flashing Code
064 065	Open circuit - flame sensor Short circuit - flame sensor	Flame sensor signals temperature value outside measurement range. Check the connecting leads (0.35 green). Impedance between terminals 10 and 12 of the control unit (internal plug): greater than 50 kohms (in the event of interruption) less than 100 ohms (in the event of short-circuit). Flame sensor values: 900 ohms at -25°C, 1100 ohms at +25°C.	
071 072	Open circuit - overheat sensor Short circuit - overheat sensor	Overheat sensor signals temperature value outside measurement range. Check the connecting leads (0.35 blue). Impedance between terminals 5 and 8 of the control unit (internal plug): greater than 700 kohms (in the event of interruption) less than 100 ohms (in the event of short-circuit). Overheat sensor values: 150 kohms at -25°C, 10 kohms at +25°C.	
090 093 094 097	Control unit defect (internal fault) Control unit defective(RAM error) Control unit defective(EPROM fault) Control unit defective (power failure)	Internal control unit error in microprocessor/memory detected. Replace control unit.	 8 seconds

Fuel Quantity Test

The fuel Quantity should be tested if the heater has difficulty starting or maintaining a flame.

Note: Measure the fuel quantity when the battery is sufficiently charged. At least 11V/22V and at most 13V/26V should be applied at the control unit during measurement.

Preparation

- Pull the fuel line from the heater and insert into a graduated measuring glass (size: 25cm^3).

  Espar # 5520005.
- Switch the heater on, when fuel delivery is uniform (approximately 63 seconds after switching on), the fuel line is full and bled.

Measurement

- Switch the heater off and empty the measuring glass.
- Switch heater on.
- Fuel delivery stars automatically approximately 63 seconds after switching on.
- After 105 seconds of fuel delivery, it will shut off automatically.
- Wait for restart.
- Fuel pump is automatically switched off after another 75 seconds.
- Switch off the heater.
- Measure the fuel in the measuring glass.

Evaluation

Nominal value: 18 ml± 10%

If the quantity is less than the tolerance, replace the fuel metering pump.

Repair Steps

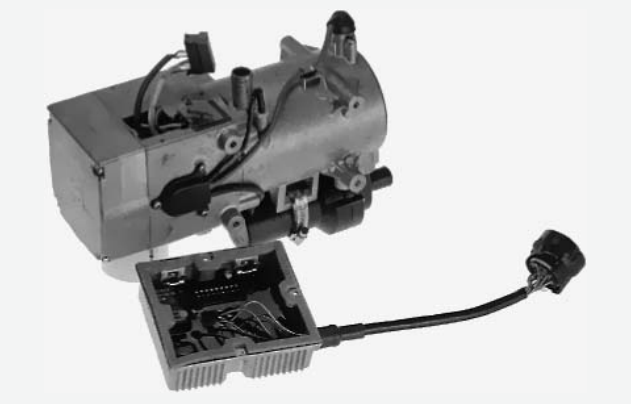
Disassembly / Assembly

1	Control unit
2	Glow pin cable
3	Glow pin
4	Overheat sensor / temperature sensor
5	Cover Blower
6	Flame sensor/heat exchanger fastening screws
7	Housing including heat exchanger, dismantled
8	Burner
9	Burner dismantled
10	Heat exchanger
11	Heat exchanger dismantled

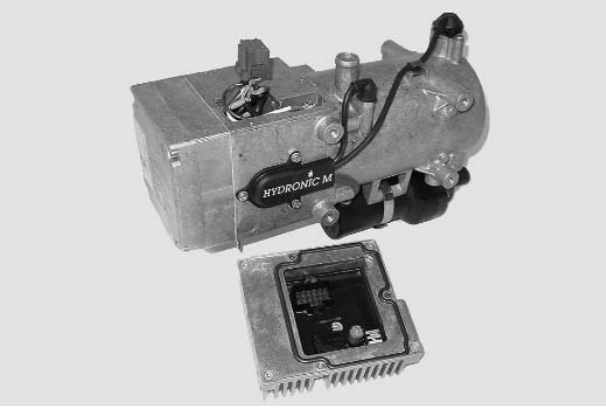
Resistance Values

Temperature sensor	**-25°C**	**650 ohms**
	25°C	**1000 ohms**
Flame sensor	**-25°C**	**900 ohms**
	25°C	**1100 ohms**
Overheat sensor	**-25°C**	**150 Kohms**
	25°C	**10 Kohms**
Glow Pin	**~2 ohms**	
Fuel Metering Pump	**~20ohms**	
Coolant Pump	**varies with motor speed**	
Combustion Air Blower	**varies with motor speed**	

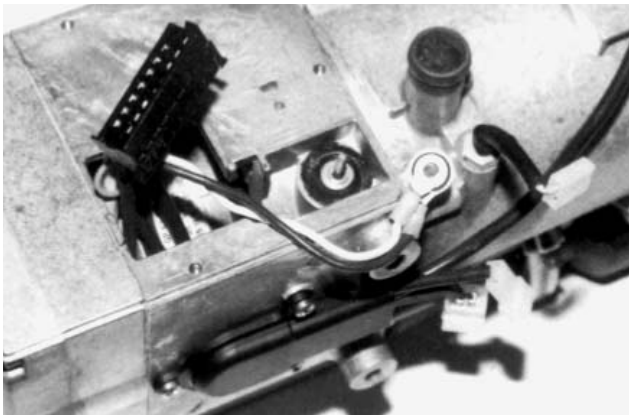
1 Control unit *HYDRONIC 10* (on installation of control unit, grease the gasket with sealing paste).



1 Control unit *HYDRONIC 10* (on installation of control unit, grease the gasket with sealing paste).

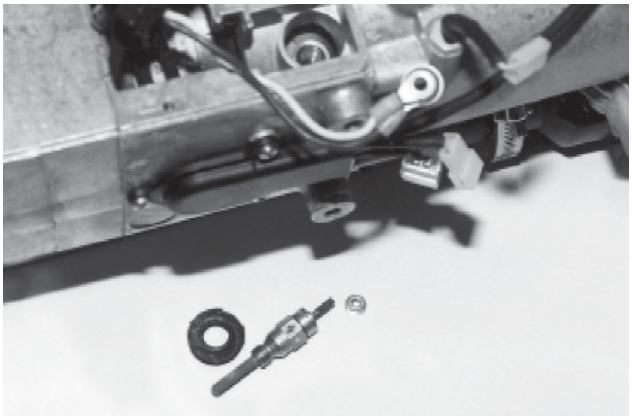


2 Glow plug cable *HYDRONIC 10.*



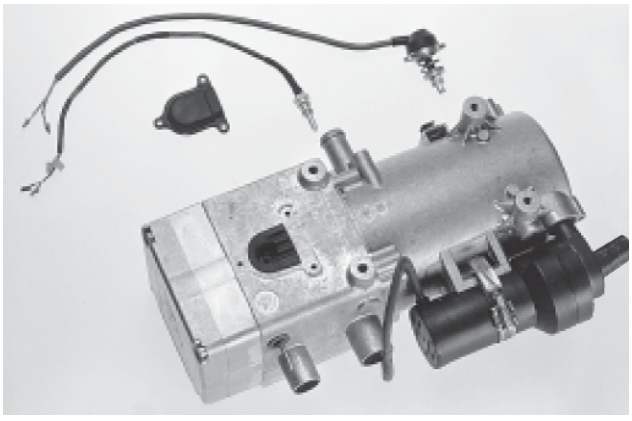
2 Glow plug cable *HYDRONIC M.*

3 Glow plug *HYDRONIC 10.*

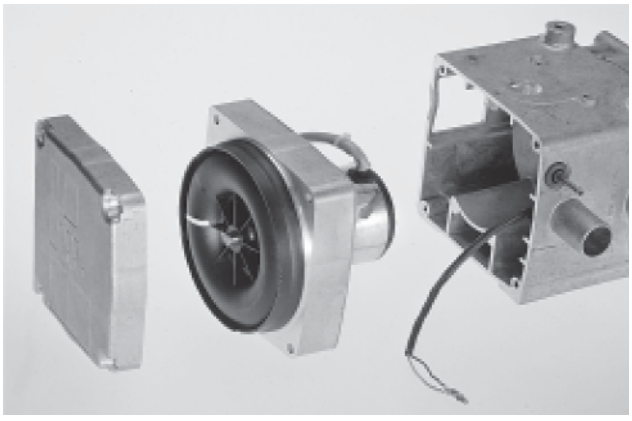


3 Glow plug *HYDRONIC M.*

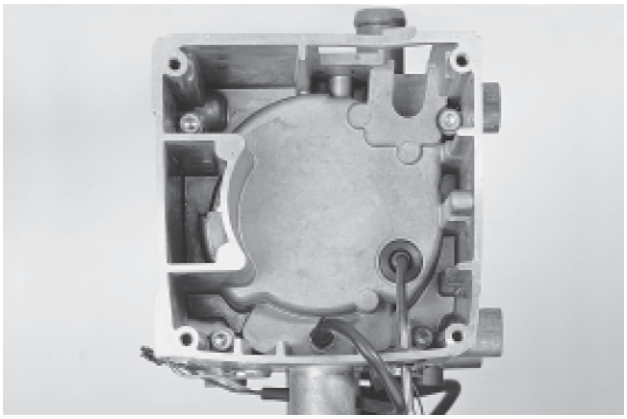
4 Overheat sensor / temperature.



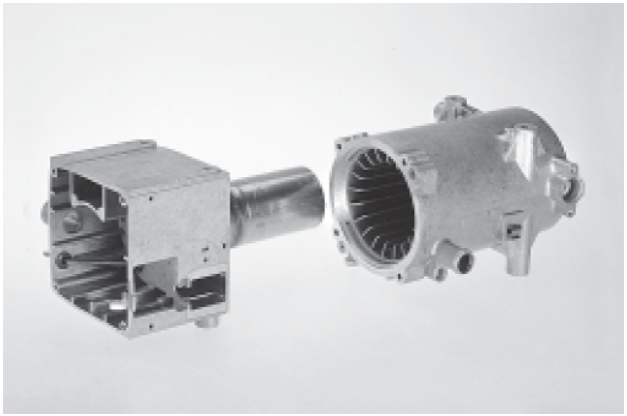
5 Cover Blower (on installation of the cover, clean the sealing surface and apply liquid seal).



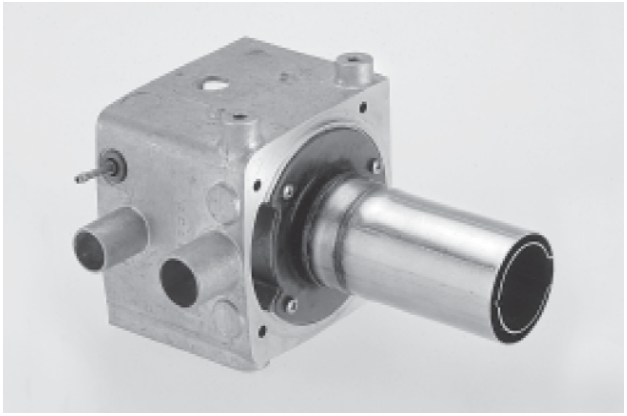
6 Flame sensor / heat exchanger fastening screws.



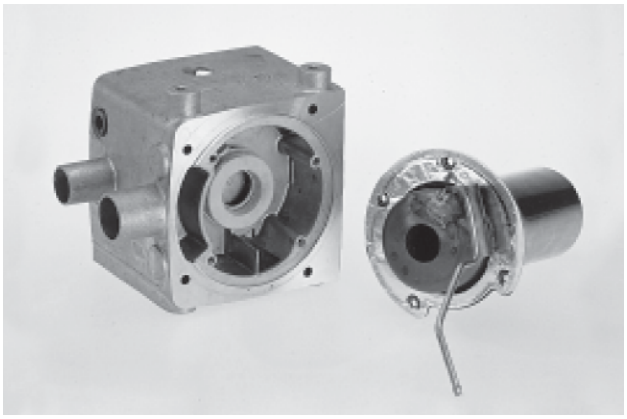
7 Housing including heat exchanger, dismantled.



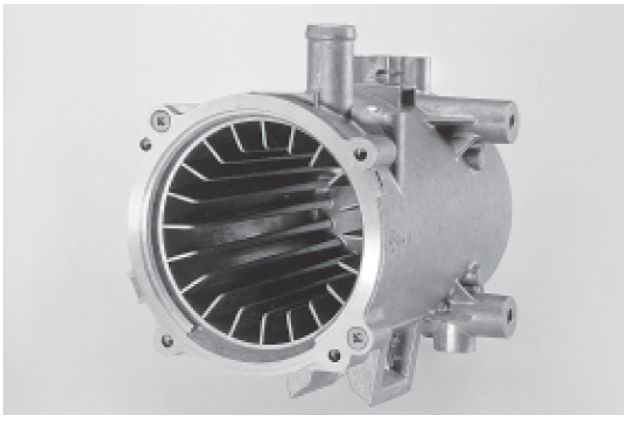
8 Burner.



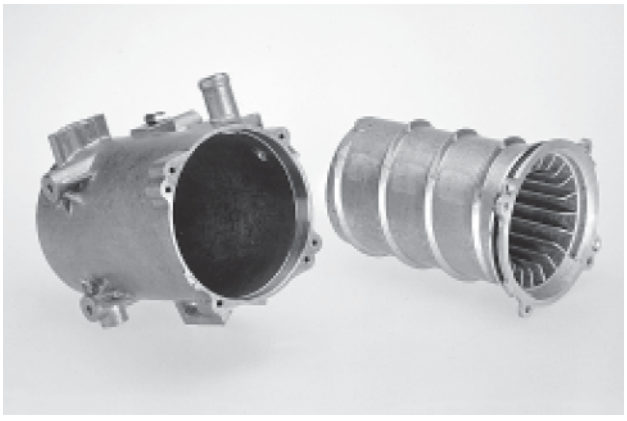
9 Burner dismantled.



10 Heat exchanger.



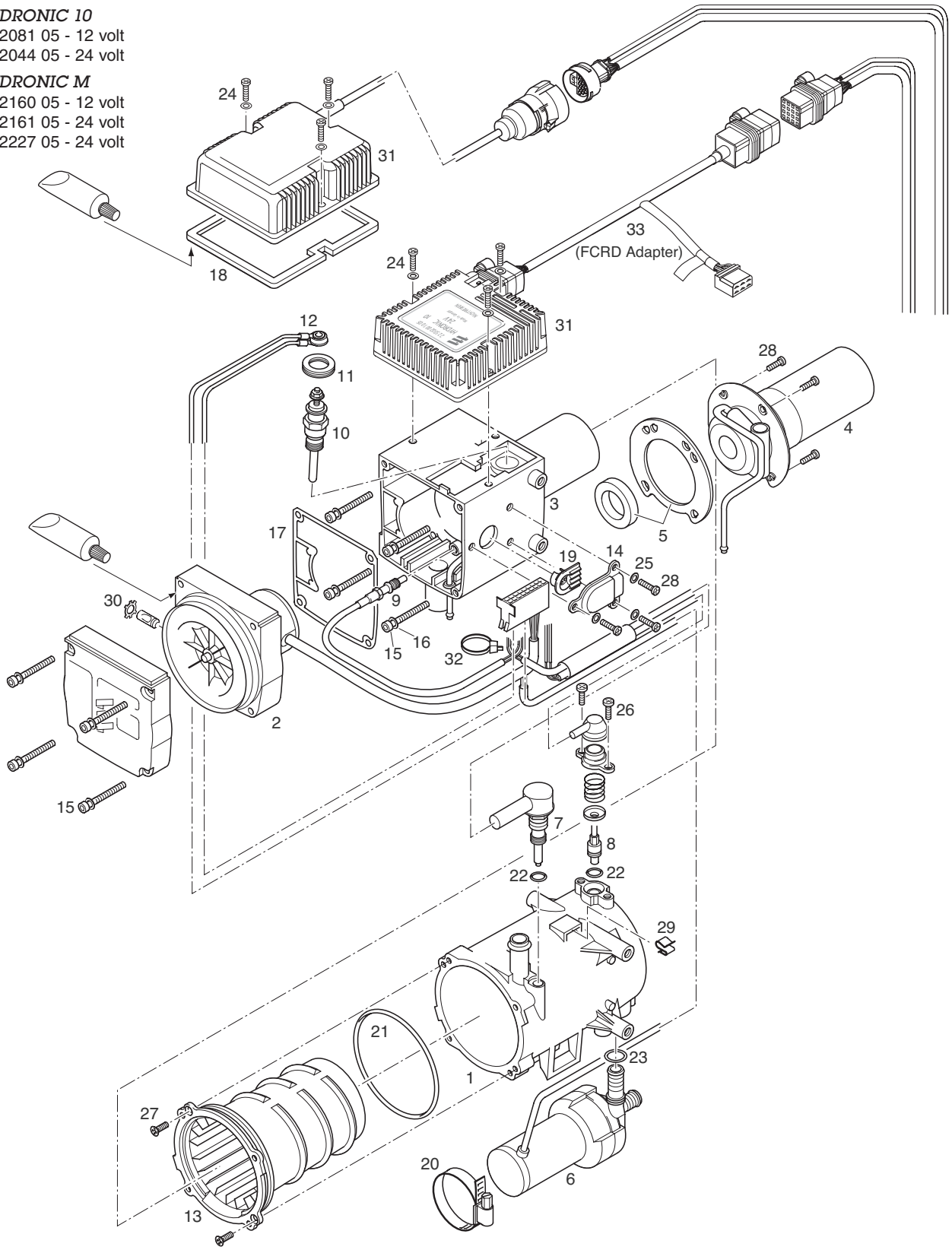
11 Heat exchanger dismantled.



Hydronic 10 and Hydronic M Parts Diagram

HYDRONIC 10
25 2081 05 - 12 volt
25 2044 05 - 24 volt

HYDRONIC M
25 2160 05 - 12 volt
25 2161 05 - 24 volt
25 2227 05 - 24 volt



Hydronic 10 / M - 12 & 24 volt - Diesel & Gasoline versions

Description & Part #'s

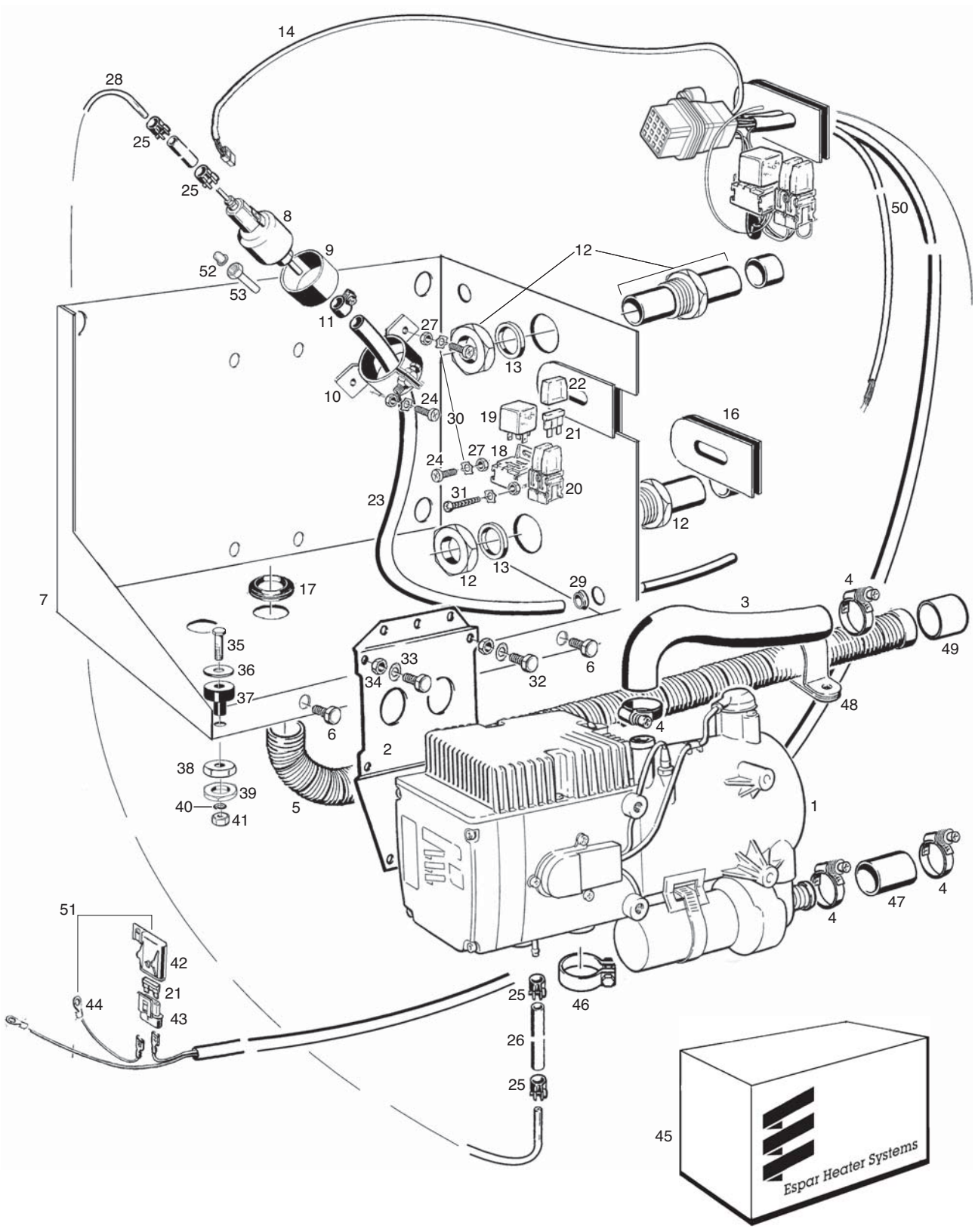
Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
1	Outer casing		25 1997 01 00 02	•	•	•	•	•
2	Combustion air blower with cover		25 1815 99 15 00	•				
			25 1816 99 15 00		•			
			25 2160 99 15 00			•		
			25 2161 99 15 00				•	•
3	Burner assembly		25 2044 99 11 00	•	•	•		
			25 2161 99 11 00			•	•	•
4	Flame tube and burner		25 2044 11 01 00	•	•	•	•	•
5	Seal		25 1816 99 11 07	•	•	•	•	•
6	Water pump		25 1815 25 01 00	•		•		
			25 1816 25 01 00		•		•	•
7	Temperature Sensor		25 1816 99 01 11	•	•			
			25 1816 99 01 11			•	•	•
8	Overheat sensor		25 1997 99 41 00	•	•	•	•	•
9	Flame sensor		25 1816 01 03 00	•	•	•	•	•
10	Glow pin	12V	25 1996 99 01 01	•		•		
		24V	25 1997 99 01 01		•		•	•
11	Seal		25 2044 01 00 12	•	•	•	•	•
12	Glow plug cable		25 2044 01 04 00	•	•	•	•	•
13	Heat exchanger		25 1816 06 00 01	•	•	•	•	•
14	Cover		25 2044 01 00 11	•	•	•	•	•
15	Screw		100 61 317	•	•	•	•	•
16	Washer		171 22 118	•	•	•	•	•
17	Seal		25 1816 01 00 04	•	•	•	•	•
18	Seal		25 1816 01 13 00	•	•			
19	Sleeve		25 1816 01 00 12	•	•	•	•	•
20	Clamp		10 2065 05 00 70	•	•	•	•	•
21	O-ring		22 1000 70 00 01	•	•	•	•	•
22	O-ring		22 1000 70 00 09	•	•	•	•	•
23	O-ring		22 1000 70 00 03	•	•	•	•	•
24	Fillister head bolt		109 10 107	•	•	•	•	•
25	Spring washer		171 22 101	•	•	•	•	•
26	Taptite screw		109 10 153	•	•			
			109 10 104			•	•	•
27	Taptite screw		109 10 106	•	•	•	•	•
28	Taptite screw		109 10 107	•	•	•	•	•
29	Clip		156 22 021	•	•	•	•	•
30	Indented Hexagon nut		171 19 254	•	•	•	•	•

Hydronic 10 / M - 12 & 24 volt - Diesel & Gasoline versions

Description & Part #'s

Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
31	Control unit	12V	25 2081 99 50 03	•				
		24V	25 2044 99 50 07		•			
		12V	22 5301 00 10 01			•		
		24V	22 5302 00 10 01				•	
		24V	22 5302 00 10 04					•
32	Twist tie		209 31 080	•	•	•	•	•
33	Retrieval harness for fault code device (FCRD Adapter)		CA1 05 030	•	•			
			CA1 05 044			•	•	•

Hydronic 10 and Hydronic M Parts Diagram for Boxed Units



Hydronic 10 / M Boxed - 12 & 24 volt - Diesel & Gasoline versions

Description & Part #'s

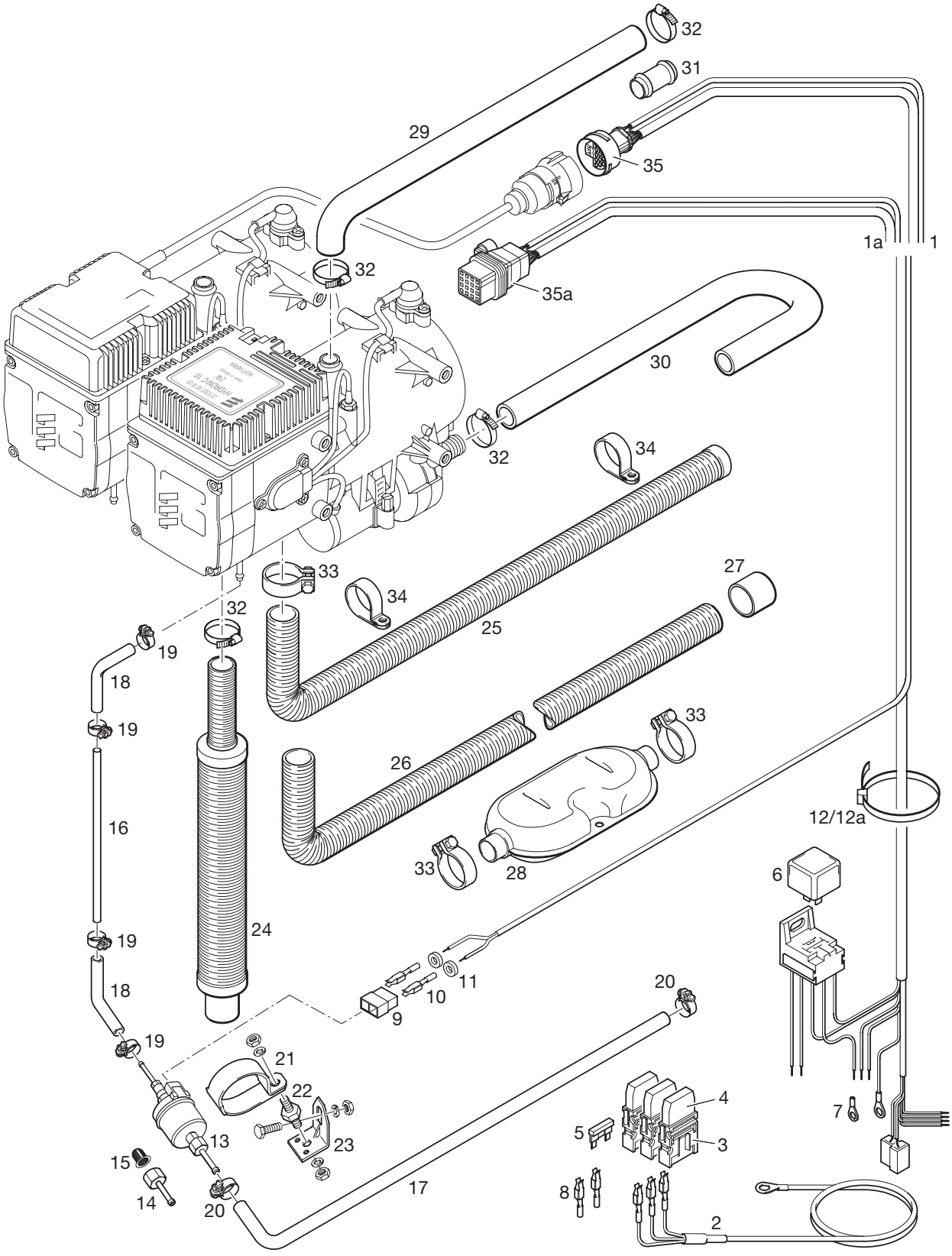
Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
1	Hydronic 10 heater		12V	•		•		
			24V		•		•	•
2	Heater mounting bracket		25 1816 80 00 01	•	•	•	•	•
3	Molded hose		20 2900 60 10 23 (CA0 11 023)	•	•	•	•	•
4	Spring loaded clamp 17-32mm		556 00 13 (CA1 10 046)	•	•	•	•	•
5	Flexible Exhaust w/ end cap		25 1816 80 08 00	•	•	•	•	•
6	Bolts 5/16x1/2 #18 stainless		559 00 07 (CA3 00 102-001)	•	•	•	•	•
7	Box Base		20 2900 40 90 01 (CA0 10 069-001)	•	•	•	•	•
8	Fuel metering pump		25 1894 45 00 00	•		•		
			25 1963 46 00 00		•		•	•
9	FPM rubber ring		20 1449 00 10 01	•	•	•	•	•
10	Fuel metering pump holder		20 1156 20 00 11	•	•	•	•	•
11	Clamp 11mm		10 2063 08 10 98	•	•	•	•	•
12	Bulk head hose connector 3/4"		20 2900 60 10 11 (CA0 11 011)	•	•	•	•	•
13	Washer Bulkhead		559 00 86 (CA3 00 311)	•	•	•	•	•
14	Connector		206 31 290	•	•	•	•	•
15	Dust Cap - bulkhead fitting		556 00 03 (CA0 11 016)	•	•	•	•	•
16	Grommet		20 2900 60 10 61 (CA0 11 061)	•	•	•	•	•
17	Silicon Seal - exhaust		25 1216 88 03 01	•	•	•	•	•
18	Blower relay block		203 00 085	•	•	•	•	•
19	Relay		203 00 065	•		•		
			203 00 066		•		•	•
20	Fuse holder		204 31 004	•	•	•	•	•
21	Fuse Inserts	5 amp	204 00 079	•	•	•	•	•
		15 amp	567 00 53 (CA1 07 002)	•	•	•	•	•
		20 amp	567 00 55 (CA1 07 005)	•	•	•	•	•
22	Fuse holder cover		204 31 005	•	•	•	•	•
23	Fuel hose		360 75 350	•	•	•	•	•
24	Hex bolt M6x12		559 00 08 (CA3 00 103)	•	•	•	•	•
25	Clamp 9mm		10 2068 00 90 98	•	•	•	•	•
26	Fuel hose 3.5mm		360 75 300	•	•	•	•	•
27	Hex nut		559 00 64 (CA3 00 208)	•	•	•	•	•
28	Plastic fuel line 2mm		090 31 117	•	•	•	•	•
29	Grommet		20 1280 09 01 03	•	•	•	•	•
30	Washer 6mm		559 00 84 (CA3 00 308)	•	•	•	•	•
31	Screw M3x30		559 00 25 (CA3 00 115-001)	•	•	•	•	•
32	Bolt M8x16		559 00 37 (CA3 00 137)	•	•	•	•	•

Hydronic 10 / M Boxed - 12 & 24 volt - Diesel & Gasoline versions

Description & Part #'s

Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
33	Washer 8mm		559 00 85 (CA3 00 309)	•	•	•	•	•
34	Nut hex 8mm		559 00 65 (CA3 00 209)	•	•	•	•	•
35	Bolt M8x50		559 00 31 (CA3 00 128)	•	•	•	•	•
36	Washer fender 5/16"x1.25		559 00 80 (CA3 00 305)	•	•	•	•	•
37	Shock mount 8mm		CA0 00 061-001	•	•	•	•	•
38	Washer for Shock		CA3 00 333-001	•	•	•	•	•
39	Threaded washer		559 00 99 (CA3 00 333)	•	•	•	•	•
40	Spring washer 8mm		559 00 78 (CA3 00 302)	•	•	•	•	•
41	Hex nut 8mm		559 00 65 (CA3 00 209)	•	•	•	•	•
42	Fuse holder cover		20 2900 60 70 09 (CA1 07 009)	•	•	•	•	•
43	Fuse holder base		567 00 55 (CA1 07 005)	•	•	•	•	•
44	Ring terminal 3/8" awg 10-12		267 01 78 (CA1 90 014)	•	•	•	•	•
45	Box cover		20 2900 40 00 70 (CA0 10 070)	•	•	•	•	•
46	Exhaust clamp 30-33mm		152 10 061	•	•	•	•	•
47	Coolant hose for boxed unit		20 2900 60 10 23 (CA0 11 023)	•	•	•	•	•
48	Clamp "P" 34mm		152 10 043	•	•	•	•	•
49	End sleeve		25 1785 80 02 00	•	•	•	•	•
50	Harness boxed	12V FMP in	20 2900 70 09 10 (CA1 60 910)	•				
		24V FMP in	(CA1 60 912)		•			
		12V FMP out	25 1801 80 02 00 (CA1 60 911)	•				
		24V FMP out	25 1864 80 00 02 (CA1 60 913)		•			
		24V FMP out	20 2900 70 10 02 (CA1 60 1002)				•	•
		12V FMP in	20 2900 70 10 06 (CA1 60 1006)			•		
		12V FMP out	20 2900 70 10 07 (CA1 60 1007)			•		
		24V FMP in	20 2900 70 10 08 (CA1 60 1008)				•	•
51	Power pig tail	12V	20 2900 70 09 20 (CA1 60 901-002)	•				
		24V	20 2900 70 10 01 (CA1 60 901-001)		•			
52	Cup sieve		20 1312 00 00 06	•	•	•	•	•
53	Fuel connection piece		20 1621 45 00 02	•	•	•	•	•

Hydronic 10 / M Parts Diagram - Universal Version - Diesel & Gasoline versions

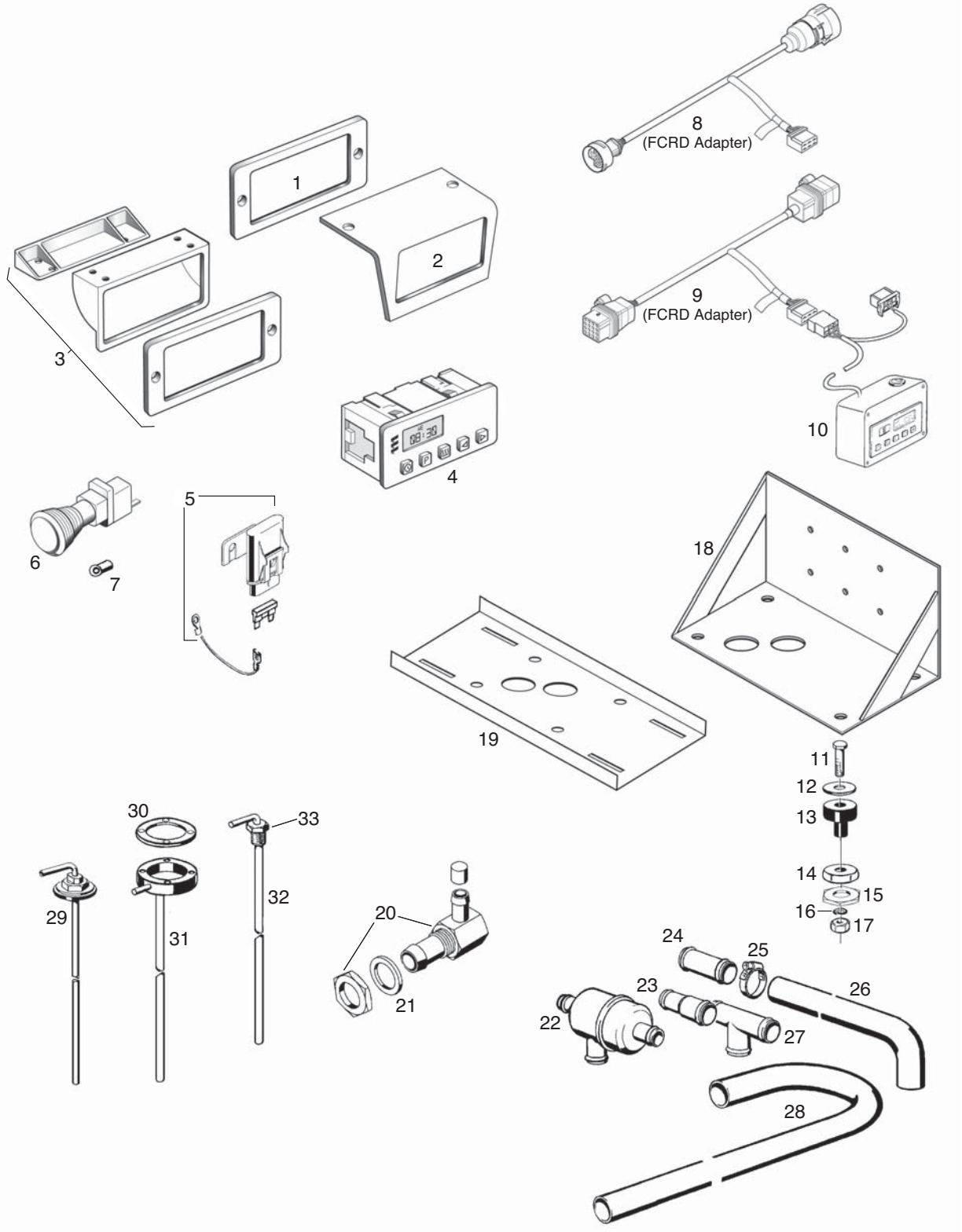


Hydronic 10 / M - Universal Version - Diesel & Gasoline versions

Description & Part #'s

Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
1	Universal harness		25 1816 80 07 00	•	•			
			25 1816 80 06 00		•			
1a	Universal harness		25 2160 80 07 00			•	•	•
2	Cable		20 1668 80 05 00	•	•	•	•	•
3	Fuse holder bottom		204 31 004	•	•	•	•	•
4	Fuse holder cover		204 31 005	•	•	•	•	•
5	Fuse inserts	5 amp	204 00 079	•	•	•	•	•
		15 amp	567 00 53 (CA1 07 002)		•		•	
		20 amp	567 00 55 (CA1 07 005)	•		•		
		25 amp	204 00 089	•	•	•	•	•
6	Relay		203 00 065	•		•		
			203 00 066		•		•	•
7	Ring terminal 3/8" awg 10-12		567 01 78 (CA1 90 014)	•	•	•	•	•
8	Twin leaf spring contact awg 12		206 73 033	•	•			
			206 73 058	•	•	•	•	•
9	Socket housing		206 31 290	•	•	•	•	•
10	Female terminals		206 00 182	•	•	•	•	•
11	Seal		206 75 022	•	•	•	•	•
12	Tie cables	5 x 200	559 00 03 (CA1 00 005)	•	•	•	•	•
12a	Tie cables	5 x 360	25 1816 80 02 00	•	•	•	•	•
13	Fuel metering pump		25 1894 45 00 00	•		•		
			25 1963 46 00 00		•		•	•
14	Fuel connection piece		20 1621 45 00 02	•	•	•	•	•
15	Cup sieve		20 1312 00 00 06	•	•	•	•	•
16	Fuel line		090 31 108	•	•	•	•	•
17	Fuel hose		360 75 350	•	•	•	•	•
18	Fuel hose-pressure side		360 75 300	•	•	•	•	•
19	Clamps		10 2063 00 90 98	•	•	•	•	•
20	Clamp (suction side)		10 2063 01 10 98	•	•	•	•	•
21	"P" clamp		152 10 040	•	•	•	•	•
22	Metal rubber buffer		20 1185 00 00 01	•	•	•	•	•
23	Angle		20 1348 03 00 04	•	•	•	•	•
24	Intake silencer		25 1786 80 02 00	•	•	•	•	•
25	Exhaust (flexible)		25 1816 80 08 00	•	•	•	•	•
26	Flexible spiral tubing		360 61 580	•	•	•	•	•
27	End sleeve		25 1785 80 02 00	•	•	•	•	•
28	Muffler		25 1806 80 01 00	•	•	•	•	•
29	Coolant hose		20 1673 80 00 01	•	•	•	•	•
30	Coolant hose		20 1673 80 00 03	•	•	•	•	•
31	Connection piece		25 1534 88 00 01	•	•	•	•	•
32	Clamps		10 2065 02 00 32	•	•	•	•	•
33	Hose clamps		152 10 061	•	•	•	•	•
34	Muffler clamps		152 10 049	•	•	•	•	•
35	Round Socket housing		25 1766 65 02 00	•	•			
35a	Square Socket housing		22 1000 31 93 00			•	•	•

Hydronic 10 Accesories



Hydronic 10 / M Accessories

Description & Part #'s

Ref. No.	Description		Part Number	Model # 25 2081 05 12V	25 2044 05 24V	25 2160 05 12V	25 2161 05 24V	25 2227 05 24V
1	7 day timer bezel		25 1482 70 01 00	•	•	•	•	•
2	Bracket for 7 day timer		20 2900 40 01 58	•	•	•	•	•
3	Complete 7 day timer bracket kit with bezel and bracket		25 1482 70 01 00	•	•	•	•	•
4	7 day timer		25 2900 70 02 30	•	•	•	•	•
5	Fuse link power harness	12V	(CA1 60 901-002) 20 2900 70 09 20	•		•		
		24V	(CA1 60 901-001) 20 2900 70 10 01		•		•	•
6	Push / Pull switch	12V	(CA100 003) 567 00 07	•		•		
		24V	(CA100 004) 567 00 08		•		•	•
7	Bulb (push/pull switch)	12V	207 00 005	•		•		
		24V	207 00 006		•		•	•
8	Fault code harness adapter		(CA1 05 030) 20 2900 70 50 30	•	•	•	•	•
9	Fault code harness adapter		(CA1 05 044) 20 2900 70 50 44	•	•	•	•	•
10	Fault code retrieval device		(CA1 05 020) 20 2900 70 50 20	•	•	•	•	•
11	Bolt M8x50		(CA3 00 128) 559 0031	•	•	•	•	•
12	Fender Washer 5/16		CA0 00 305	•	•	•	•	•
13	Shock		(CA0 00 061-001) 554 0007	•	•	•	•	•
14	Special Washer for Shock		(CA3 00 333-001) 559 0100	•	•	•	•	•
15	Threaded nut / washer		(CA3 00 333) 559 0099	•	•	•	•	•
16	Lock washer 8mm		(CA3 00 302) 559 0078	•	•	•	•	•
17	Nut 8mm		(CA3 00 209) 559 0065	•	•	•	•	•
18	Side mount bracket		(CA0 10 057) 20 2900 40 00 57	•	•	•	•	•
19	Cross frame mounting tray		(CA0 10 022) 20 2900 40 00 28	•	•	•	•	•
20	90° bulkhead hose connector		(CA0 11 037) 20 2900 60 10 37	•	•	•	•	•
21	Washer - bulkhead		(CA3 00 086) 559 00 86	•	•	•	•	•
22	Water thermostat 3x18		330 00 160	•	•	•	•	•
23	Reducing piece 20x18mm		20 1645 89 00 06	•	•	•	•	•
24	Connecting pipe		20 1534 88 00 01	•	•	•	•	•
25	Clamp 20mm - 32mm		10 2065 02 00 32	•	•	•	•	•
26	Coolant hose 90°		20 1673 80 00 01	•	•	•	•	•
27	T-piece 20x20x20mm		20 1673 80 11 00	•	•	•	•	•
28	Coolant hose 180°		20 1673 80 00 03	•	•	•	•	•
29	Fuel pick up pipe		(CA0 12 058) 20 2900 20 20 58	•	•	•	•	•
30	Gasket		(CA0 12 040) 552 00 14	•	•	•	•	•
31	Single pick up with ring fitting		25 1864 80 00 02	•	•	•	•	•
32	Custom straight pick up	16"	(CA0 00 030) 552 00 01	•	•	•	•	•
33	Compression fittings	1/4" NPT	(CA0 12 044) 20 2900 20 20 44	•	•	•	•	•
		3/8" NPT	(CA0 00 031) 552 00 02	•	•	•	•	•
		1/2" NPT	(CA0 12 006) 552 00 06	•	•	•	•	•

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